The implementation of computers in a secondary school : a case study of teachers' perceptions about computers in teaching within the social organisation of a comprehensive school.

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THE IMPLEMENTATION OF COMPUTERS IN A SECONDARY SCHOOL : A Case Study of Teachers' Perceptions about Computers in Teaching within the Social Organisation of a Comprehensive School.

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ABSTRACT

The research consisted of an in-depth study of the implementation of computers in a comprehensive school which had recently purchased seventeen microcomputers. The research looked at the different factors which influenced the introduction of computers into the school. These factors were analysed at three different levels - that of the teacher, the department and the school. At the level of the teacher, teachers' experiences and views of computers and the use of computers in teaching were analysed; at the level of the department, heads of departments' policies in relation to the purchase and use of computers and teachers' reactions to such policies were studied; and at the level of the school, the distribution of resources and facilities were examined. The research study was conducted in three major stages, with semi-structured interviews and questionnaires as the main data-collection instruments used. Lundgren's Frame Factor Theory, White and Lippitt's (1968) leadership categories, and Lewin's (1952) Force Field representations, provided frameworks to organise and describe data in the interviews.

It could be seen that the actual uptake of computers is very much dependent upon the interplay of various factors at different levels. It became apparent that the views and opinions held by teachers about computers were not just black or white, but revealed an extremely broad spectrum of views, even within just five departments of a school. Teachers perceived that the use of computers in teaching would result in changes in themselves as an authority, changes in themselves being in authority, and changes in their teaching situation. Organisational constraints were seen as barriers to teachers, which many of them felt could not be solved by themselves but which needed the cooperation from staff "above" them. Some of the main organisational constraints perceived by teachers included those of insufficient time, lack of finance and resources, and the limitation of having big class sizes. All three different leadership styles of autocratic, democratic and laissez-faire were found in the five departments. It seemed that the majority of these teachers initially needed strong guidance before they would venture using computers in their teaching. Leadership styles and strategies which provided resources, training and time, were important before any uptake of computers could occur.

To Mum & Dad

for all your love and understanding

and

for bringing me up in the fear of the Lord.

2 Timothy 3:15

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* Barnaby comes from the word "Barnabus" which means "Son of Encouragement".

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PART ONE CHAPTER 1 : INTRODUCTION

1.0 NATIONAL INITIATIVES

About two years before this research study commenced, the United Kingdom government introduced two parallel projects for schools which was announced in March 1980 - the Microelectronics Education Programme (MEP) for England, Wales and Northern Ireland, with a budget of about £12 million; and the Scottish Microelectronics Development Programme (SMDP), with a budget of about £1.3 million. Each of the two Programmes were concerned with the whole school cycle of compulsory full-time education for children aged 5-16 years, and with non-vocational college courses for students aged 16-19 years. The Programmes were set up largely as autonomous activities with their own Directors.

The aim of the MEP (Fothergill, 1981) was stated as being "to help schools to prepare children for life in a society in which devices and systems based on microelectronics are commonplace and pervasive". Two broad areas that were looked at by the MEP (Fothergill & Anderson, 1981) was firstly, to investigate the most appropriate ways of using the computer in different areas of the curriculum, whether for the individual child, for small groups of children, or as a system which involves the whole class. Secondly, it aimed to introduce new topics in the curriculum, either as separate disciplines or as new elements of existing subjects. Within this framework, the MEP aimed to provide central assistance to curriculum development, teacher training, and resource organisation and support. These matters would be dealt with by a coordinated network of 14 regional information centres, each with its own regional director. The Programme, which was initially financed for a period of four years by the Department of Education, was later extended for a further period of two years (ending March 1986).

The aims and strategy of the SMDP were broadly similar to the MEP although its establishment dated further back to that of the MEP. SMDP was launched in 1979 by the Scottish Education Department with the aim of being a "pump-priming agency stimulating developments in a selected group of projects based in schools and colleges" (Walker & Megarry, 1981) starting

with an initial budget of only £320,000. This was referred to as Phase 1 of SMDP, and a national hardware and software centre was established. Phase 2 was officially announced in April 1980 with a budget of £1 million over a period of four years. The emphasis of Phase 2 was on the continual development of educational software, and a software library was set up and links made with the MEP.

In addition to these two major Programmes, the Department of Trade and Industry (DTI) decided to provide an impetus to these Programmes by launching a scheme (at a cost of £7 million) to enable all schools to purchase, at half-price, a computer system based either on the Research Machines Ltd. (RML) 380Z, or on the BBC Acorn microcomputers. This was launched in 1981 with the aim of encouraging the purchase of a microcomputer system for every secondary school by the end of 1982. This scheme was subsequently extended to include primary schools with the similar aim of putting a microcomputer system in every primary school by the end of 1984. This scheme was again later extended to include the purchase of certain peripherals, a monitor and printer each. A condition of the school receiving this assistance was that the school had to send two of its staff to an approved In-Service Training (INSET) introductory course on computer awareness.

Other contributing agencies which provided an additional impetus to this national drive included the British Broadcasting Corporation (BBC) which launched a series of television and radio programmes (the Computer Literacy Project being the initial television boost) aimed to provide a general appreciation of computers and computer technology in different areas of life and society; and the National Extension College and the Open University which produced distance/open learning packages on computer awareness. In hindsight, not only did the BBC television and radio programmes provided an awareness to school children, but was also highly instrumental in raising the general public's awareness of computers and information technology. This had a direct effect on the schools, as parents of school children (and teachers themselves) were influenced and this in-turn encouraged them to support the purchase of computers in their childrens' schools or their own schools.

At the time of the concluding stages of this research study, the MEP funding had ended and the government had decided (with much criticism from MEP itself) to provide only a support unit called the Microelectronics Support Unit, whose main brief is to provide a supporting role to the work started by the MEP. Funds would be provided centrally for only five years, with £2.2 million allocated for the first year and unspecified amounts later. The Scottish equivalent was more fortunate with the SMDP receiving continued funding centrally and being incorporated as part of the Scottish Council for Educational Technology.

1.1 THE GROWTH OF COMPUTERS IN SCHOOLS

Internationally, there was a "microelectronics revolution" whereby microelectronics technology was becoming more and more sophisticated and powerful (in terms of memory capacity and speed of calculation), with a reduction in the cost and physical size of the microprocessors. The actual growth of computers in British schools came mainly as a result of these government initiatives. This is because although microcomputer prices had dropped, the cost of a basic computer system configuration (computer plus disc drives and monitor) was still in the range of about £1,000 in the early 1980s which, comparatively, was prohibitive for schools who were still finding money for textbooks etc. Surveys carried out by Mathew (1982) of the BBC Educational Broadcasting Services on computers in secondary education, and another by Educational Computing (1984) both confirmed the fact that the majority of the schools they had surveyed only started buying computers when the Department of Trade and Industry's "£1 for £1" offer (i.e. 50% subsidy of hardware costs) was initiated. Together with additional support from Parent-Teacher Associations and through special school-funding activities, schools started to seriously consider the purchase of computers as a viable option. These initiatives have thus led to a relative leap in the purchase of computers in schools since 1981. For example, in 1982, the average number of computers in secondary schools was 3.2 (Mathew, 1982), increasing to 7.4 in 1983 and to 8.5 in 1984 (Educational Computing, 1984), and by 1985 the avearge number of computers in secondary schools was 13.5 microcomputers (Forthergill, 1986) - a percentage increase of over 400% over a period of about 3 years. This is shown in Figure 1.1.

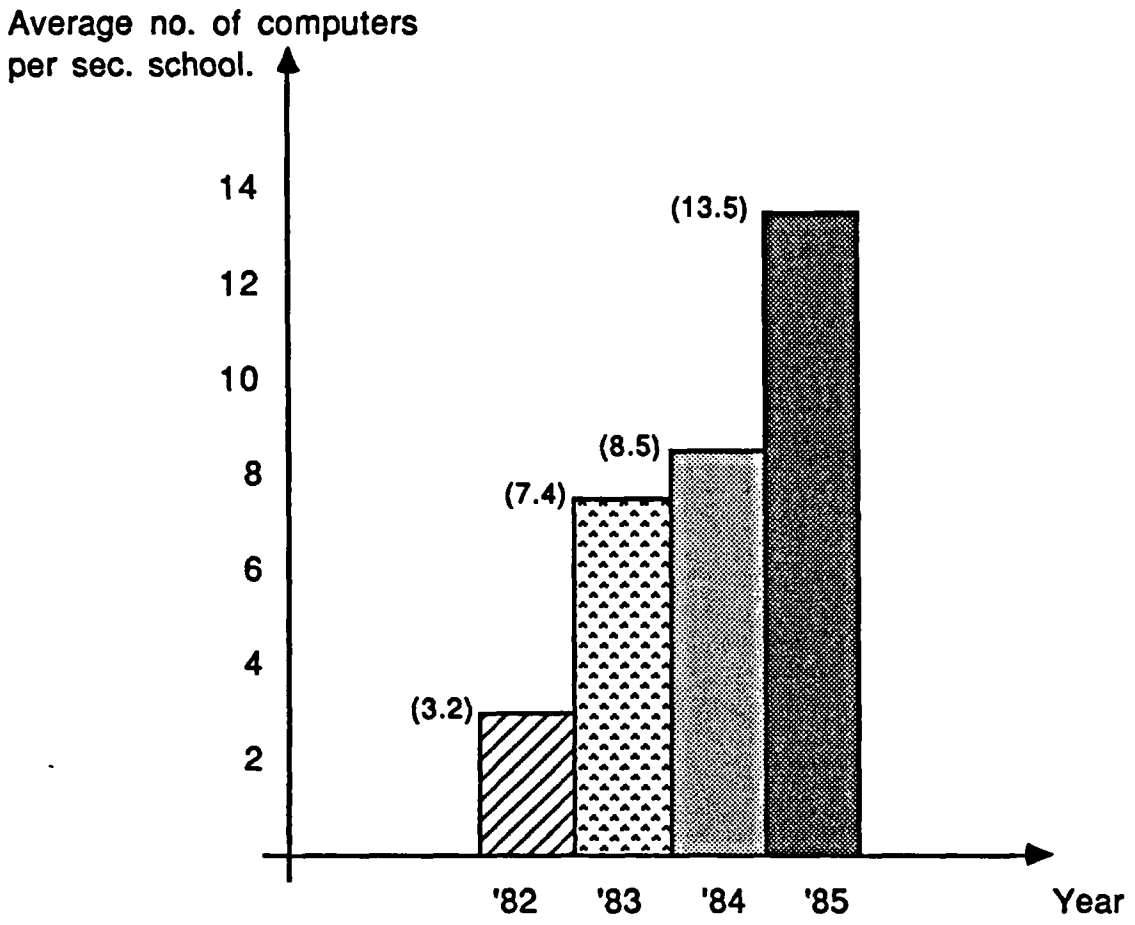


Figure 1.1 Average number of computers per secondary school in the UK

What, however, was more important to note was that in all these surveys, those that conducted the surveys began to realise that the emphasis in these schools was primarily in obtaining hardware, while other areas, for example sofware development, training and knowing how to teach with computers, seemed to be a secondary issue.

1.2 MAIN ISSUES NOT ADDRESSED

When it came to the use of computers in teaching and their applicability in the curriculum, however, there was a growing concern. Atkins (1981) who conducted a survey for the Educational Broadcasting Councils for the United Kingdom in the months of February and March 1981, found that the LEAs' main emphasis at that time was on Computer Studies for the

upper secondary school. Mathews' survey (1982) showed that 94% of the teachers who used computers were in the Mathematics and/or Computing departments, 69% of the teachers who used computers were from one or more of the Science departments, and only 23% of teachers who used computers were in the Humanities (with the Geography department heading the list). Thus, although there was a substantial amount of growth in the number of computers in schools, the worry was that only a certain part of the school curriculum was being exposed to this new educational media.

What was even more of a concern was that when it came to the training of teachers, Atkins (1981) noted that most of the in-service training courses conducted by the local authorities were concerned with Computer Studies (84%). In addition, Mathew found that the majority of members of staff sent on external computer related courses were from the Mathematics, Computing and the Science departments (with Geography coming third, but quite a way behind), and little representation from other departments. Almost all the LEAs (95%) in Atkins study had someone responsible for computers/microtechnology in education, but many of these were or remained Mathematics or Science advisors. Mathew also found that 57% of the secondary schools had appointed a member of staff to be formally responsible for developing the use of computers across the school curriculum. He found, however, that the majority of these members of staff came from the Mathematics, Computing or Science departments. It was not possible to gather from these surveys whether these teachers were given adequate finance, resources and time to discharge these responsibilities. It could be hypothesised that most of these teachers were given these responsibilities in addition to their normal responsibilities (as was the case in Barnaby Comprehensive).

What seemed to be happening was that although there was a dramatic rise in the number of computers in schools, these computers seemed to be concentrated in only the Computer Studies, Mathematics or Science departments, with very few in the Humanities. It would be interesting to discover why these computers did not get used by teachers in the other departments, and if so, are the reasons given related to the nature of the computer itself, the teachers, the pupils, the heads of departments, the curriculum, or combinations of all these ?

These issues were further highlighted in an article in Computer Weekly on the Scottish Microelectronics Development Project (Hearst, D. 1982). This article reported that the external evaluators of the SMDP found a number of factors inhibiting the use of microcomputers in Scottish schools. The main ones being a lack of teacher training, and the widespread sense of isolation and poor communication between the Programme and schools. They felt that the SMDP had built up the impression that success lay in the number of machines it could distribute, not the use to which they were put. They concluded that it was "one thing to put microcomputers into schools but quite another to incorporate them properly into the curriculum".

Although attempts have been made by the MEP, for example, to address some of these important issues of hardware, software development, software implementation across the curriculum, and teacher-training, it would seem that a lot more work needs to be done to understand the underlying issues of how and why teachers use or do not use computers. Furthermore, there seemed to be the need to carry out research that would provide a basis for the design of learning experiences with computers, and thus provide frameworks of models of learning, teaching and the organisation of knowledge in the use of computers in teaching. This understanding of computer implementation and innovation would, in-turn, contribute to the planning and development of appropriate teacher-training schemes, software development projects, and the actual use of computers in the school and classrooms.

These concerns were supported by the Social Science Research Council's report (Sage, M. and Smith, D.J., 1983) which stressed, among other things, that,

"The factors which inhibit or promote the adoption of computers and related devices by teachers are not known or understood. Quantitative inferential data-gathering techniques seem unlikely to illuminate the plethora of personal social and professional interactions which are probably involved. It is considered that there are grounds for case studies for a relatively small number of schools. Such studies might be expected to contribute to our understanding of curriculum diffusion processes, and should also provide practising teachers with aids to the analysis of their own problems." (para. 5.13.1).

The authors thus proposed that specific initiatives be commissioned which included,

"For Immediate Implementation : A series of linked case-studies to investigate the factors which promote or inhibit the uptake of the new technology and its implications by schools.

For Eventual Implementation : A study of management strategies in the introduction of IT in education." (para. 1.6.1).

The focus of this research study is thus aimed to address some of these issues, particularly that of providing an understanding of how teachers perceive computers within their organisational setting, and how the management and leadership styles and strategies of decision makers within the organisation of a school promote or hinder the implementation of computers.

CHAPTER 2 : A REVIEW OF THE RELEVANT LITERATURE

2.0 INTRODUCTION

The world of CAL (Computer Assisted Learning) has been expanding so rapidly that this survey will concentrate only on those areas of research and theory that are directly related to computer innovation and implementation in an educational institution. The contribution that other disciplines can play in such a research work is appreciated and hence relevant aspects of the sociology of education, specifically, curriculum innovation, and the school as an organisation, are included in this survey of relevant literature. There has been a growing awareness that theoretical models have been relatively ineffective in enabling people to bring about desirable changes in education. The fields of curriculum implementation and the social organisation of schools are complex and there are still very inadequate models to show how the different parts are related in an innovation.

This chapter attempts to look, firstly, at a few of the general theories of curriculum innovation; secondly, at the organisation of schools in the context of curriculum innovation; and thirdly, at research studies done in the area of computer/CAL innovations in this country and in the U.S.A. In this research work, a theoretical framework of curriculum innovation in schools, derived from Lundgren's Frame Factor Theory, is used in analysing the introduction of the use of computers in a single school (i.e. a case-study approach).

The review will not include a survey of the advantages and disadvantages of computers and CAL, studies on the effectiveness of CAL, specific CAL programs like PLATO or TACCIT, a comparison of the use of mainframe computers and microcomputers in education, or the introduction and use of computers in industry, business or at home. In addition, it does not include the various articles that have been written which are discussions of ideas but which do not include any empirical evidence. While these are interesting, the review will only concentrate on those studies that have been supported by some form of research work.

2.1 CURRICULUM INNOVATIONS

The theories associated with innovation (especially those pertaining to the curriculum) come from different sources and traditions, and therefore, the definitions of innovation differ. In trying to make sense of the effect upon schools of new ideas, new materials, new teaching methods and new forms of organisation, concepts from many branches of the social sciences have been used.

If a sociology of curricular innovation is to emerge, it will need to provide a conceptual framework which enhances our understanding in the following areas :

1. The "nature" of the innovation, the innovator, the user, and the environment where the innovation takes place.

2. The processes involved in the adaptation, and/or adoption and implementation of innovations in, for example, schools and the wider educational systems; and would include the processes involved in the communication of innovation from the initiator or developer to potential users.

3. The ways of evaluating the "success" or "failure", i.e. the effectiveness, of the innovation.

2.1.1 The Nature, Process and Evaluation of Innovations

Most studies on innovation see that some form of change occurs during the process of an innovation, although it might be in varying degrees and forms. Hoyle, E. (1970) and Miles, M.B. (1964) regarded most educational innovations as not having been planned and usually proceeding in an ad hoc manner. The distinction was also made between the terms "diffusion" and "dissemination" of innovations. "Dissemination" was seen as planned and organised, while "diffusion" was haphazard and unstructured. They suggested that the faithful adoption of innovations rarely occurs but that a form of adaptation occurs before adoption takes place.

Hoyle and Miles saw innovation as going beyond the strong dependence on the individual response of decision-makers and users, to having strategies for change and adoption that would, among other things, require a change in the organisation itself. They suggested that more attention should be given to these strategies and the process of implementation, and not just on the construction (i.e. design) of the innovation.

There have been various attempts made to formulate a typology of strategies for change. Chin, R. and Benne, K.D. (1976) described three different types of strategies: power-coercive, normative-re-educative, and rational-empirical.

1. Power-coercive Strategies. This is when the exercise of power is used to alter an existing situation. Change occurs via the deliberate re-structuring of the situation by a person having the necessary authority. Typically, it involves the use of legal or administrative power.

2. Normative-re-educative Strategies. These are strategies that assume that effective innovation requires a change of perceptions, attitudes, behaviours and skills, by means of group techniques. It involves a consultant/change agent who works in cooperation with the intended users.

3. Rational - empirical Strategies. The primary task is seen as one of demonstrating, through the best known method, the validity of the new mode (i.e. the proposed changes) in terms of increased benefits to be gained from adopting it. The assumption is that people respond rationally to the demonstrated superiority of an innovation over previous practice. This involves the use of educational and training methods and publications to disseminate knowledge and research findings.

Although these categories might be helpful in our analysis of different situations, they rarely exist in their pure forms. Certain innovations might employ a combination of strategies at different levels. For example, at one level, innovation might necessitate the change of curriculum and attitudes with both power-coercive and rational-empirical strategies being used.

Havelock, R.G. (1971), on the other hand, examined four different systems that looked at how the diffusion of knowledge in which the change agent might work. He attempted to explain the way knowledge diffuses through these systems by formulating four models of the knowledge and diffusion process. These four systems proposed by Havelock included the research, development & diffusion (RD&D) model, the social-interaction model, the problem-solver model, and the linkage model.

1. The Research Development & Diffusion (RD&D) Model. This is represented in the Figure 2.1 below.

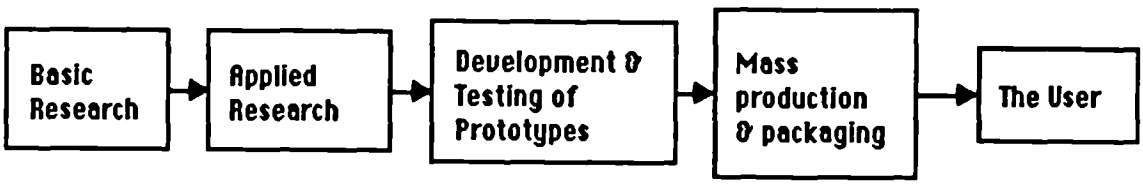


Figure 2.1 Havelock's RD&D Model

This model was used to show the process whereby ideas and tentative models of innovations were evaluated and systematically reshaped and packaged in a form that ensured benefit to users and which, therefore, eased diffusion and adoption. The model embraced essentially a rational-empirical approach (as suggested by Chin and Benne) which has led to some scepticism because of its apparent lack of actual use by the intended users who had tried to follow this model.

2. The Social-Interaction Model. This model tried to describe the patterns of social interaction by which innovations diffused through a social system. It is unsystematic and unplanned and thus a passive form of the rational-empirical strategy. This assumed that group membership, the users' place in it (centrality, peripherality and isolation) and their identification with its norms and values were important determinants of acceptance. It also assumed that the rate of diffusion followed a

predictable S-curve pattern (i.e. very slow rate at the beginning, followed by a period of very rapid diffusion, followed in turn by a long late-adopter or 'laggard' period).

The adoption of this model assumed a strong empiricist orientation which had not led to a large volume of explicit strategies or action alternatives. It had thus discouraged policy-makers and practitioners from readily adopting such a model.

3. The Problem-Solver Model. The assumption in this model was that innovation was part of a problem-solving process which went on inside the user or client system. It involved the outside change agent discussing with the client to identify and diagnose the problem. The outside change agent only acted as a 'consultant', providing new ideas or guidance. Any change agent was non-directive and the self-initiated commitment to innovation was strong. It thus combines both the strategies of the rational-empirical and the normative re-educative.

4. The Linkage Model. This was Havelock's attempt to unify and integrate the above three models and the strategies embedded within them. He stressed the need to link both users and resources so that appropriate guidance, help, coordination, and resources could be provided within the different levels (i.e. at the individual level, between groups or organisations, including remote organisations, etc.). This is shown in Figure 2.2. Havelock also emphasized, in whatever strategy adopted, the need for communication channels (for example, written, audio and visual media), training and feedback techniques and procedures.

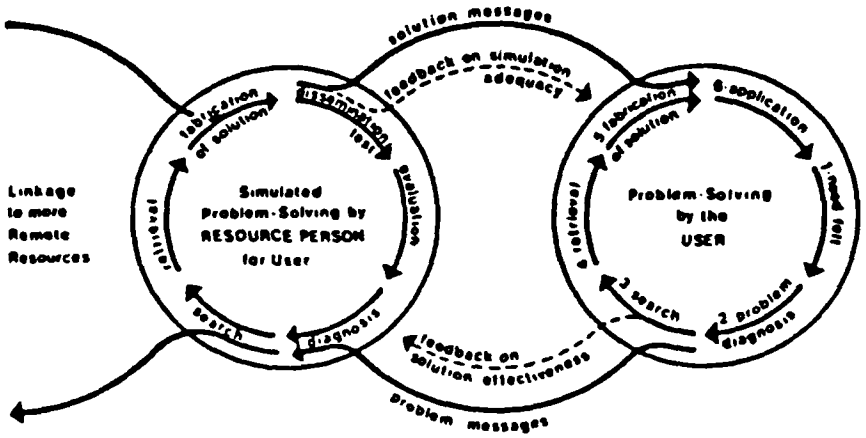


Figure 2.2 Havelock's Linkage Model

Bolam, R. (1975) stressed in particular the need to incorporate in any model the dimension of "time", and analysed this dimension of time in terms of three stages - the antecedent, interactive and consequent stages within three "systems" of change agent, innovation and user:

1. The Antecedent Stage. This was described as the stage before the innovation process begins. At this stage, the change agent, innovation and user may exist, but separately. He stressed however, that it would be helpful to understand the relationships that might exist between these three systems of change agent, innovation and user, if any.

2. The Interactive Stage. This is the stage when the innovation is being introduced. The interaction between these three groups was seen to be critical and special attention was paid to the communication modes and strategies being used. This stage corresponds to the "Interest, Evaluation and Trial Stages" used by Eichholz, G. & Rogers, E.M. (1964) and Rogers, E.M. & Shoemaker, F.F. (1971) which were first defined by a committee of rural sociologists in 1955 (The North Central Rural Sociology for the Study of Diffusion of Farm Practices).

3. The Consequent Stage. This involved looking at the impact which the innovation process had on all the three groups. An example would be a change of attitudes in the user to the innovation and to the change agents. It also included looking at the actual use or non-use of the innovation by the users. The "Adoption/Rejection" stage as used by Eichholz & Rogers (1964) would be included in this stage.

There were several others who looked at curriculum innovation in different ways. There were those who looked at the "success or failure" of an innovation. Others looked at the processes involved in innovations in schools and of how curriculum innovation had been diffused and adopted in schools; while others had looked at innovations in an "illuminative" form. Explanations of the success or failure of innovations has led to different analysis of the facilitators or barriers to curriculum innovation. Work by Gross, N., Giaguinta, J.B. and Bernstein, M. (1971), MacDonald, B. & Ruddock, J. (1971) and Fullan, M. & Pomfret, A. (1977)

highlighted the different factors that might promote or hinder the use of any new curriculum innovation. The analysis of different roles played by different people and organisations in innovations has been looked at more closely by Waring, M.R.H. (1975), Harding, J.M.M. (1975), Harlen, W. (1977) and Brown, C. (1981). The main proponents of the illuminative approach include Parlett, M. & Hamilton, D. (1976) .

2.1.2 The School and the Organisation of the School in the Context of Curriculum Innovation

The task of evaluating innovations, especially innovations in schools, had led to criticisms of traditional research methods and a reconsideration of how schools were viewed. Fullan, M. (1972) and Leithwood, K.A. & Russell, H.H. (1973) suggested that the actual processes involved in introducing innovations into schools needed to be looked at, and not just the "outputs" and "inputs" of the system. Katz E.; Levin, M.L.; and Hamilton, H. (1963), Miles, M.B. (1964) and Hoyle, E. (1970) stressed, among other things, the view that any form of innovation should take into account the social structure in which the innovation took place. According to Katz et al, this social structure had to do with the distribution and differentiation of roles and the characteristic patterns of interaction of people within an institution. This provides the set of boundaries and describes the major channels of person-to-person communication within which the innovation takes place. As Davies, B. (1981, p60) pointed out,

"We very badly need work on schools, suitably embedded in a complex view of their societal tasks..., which grasps the interplay between the social determinants of school work, organisation and classroom practice."

It is generally accepted by a number of educational sociologists that educational institutions are complex (Swift, 1969; Banks, 1976; and Robinson, 1981). General theories cannot, however, fully represent the subtle differences and idiosyncrasies of unique institutions. There are thus different theories which look at schools from different perspectives. Educational institutions are so pervaded by the values of teachers, parents and pupils that any single model of organisations will be too mechanistic and partial to capture the complexity of schools . Eggleston, S.J. (1967) for example, stressed the need for empirical work which recognises that

organisations have histories (i.e. it is important to disentangle how the organisation came to be) and work within a series of constraints.

One of the early perspectives of organisations was postulated by Weber, M. (1978) and is commonly known as Weber's theory of bureaucratization. Weber identified six elements of bureaucracy :

1. Fixed rules and procedures through which the bureaucrat completes his task.
2. Hierarchy of offices with an associated structure of command.
3. Files which document the action taken.
4. Specialization of various functions within the bureaucracy.
5. An identifiable career structure.
6. Impersonal methods of dealing with both employers and clients within the bureaucracy.

In most schools we can see traces of Weber's ideal type. There is a hierarchy of offices supervised by, and arising from, that of the Headteacher. Files or reports are kept on student progress. There is specific functions to be fulfilled in secondary schools, which tends to be along subject divisions. There are career lines within schools too, although rather limited, as teachers become heads of years/houses or heads of departments, then deputy heads and finally Headteachers. One of the problems of the Weberian model is in trying to fit it to the students themselves. Students are an essential part of every school. As an organisation, the school is continually faced with the task of socializing new pupils, often having little choice over who those pupils will be. To have an appreciation of schools as organisations, and to evaluate the nature of the social interaction within the schools, there is a need to have an understanding of how knowledge is defined, transmitted and evaluated within schools. Again there are different perspectives to the organisation of knowledge by different sociologists. Only a few are mentioned here.

Earlier views of the curriculum were simple and straightforward with clear aims and objectives. One such view was given by Tyler, R.W. (1949) who identified four crucial questions which he thought had to be answered in any curriculum :

1. What educational purposes should the school seek to attain ?
2. What educational experiences can be provided that are likely to attain these purposes ?
3. How can these educational experiences be effectively organised ?
4. How can we determine whether these purposes be attained ?

These earlier views could be seen to be a direct relationship between the teacher and pupil, via the curriculum. The curriculum was seen as a method to be used. This is represented as in Figure 2.3 below.

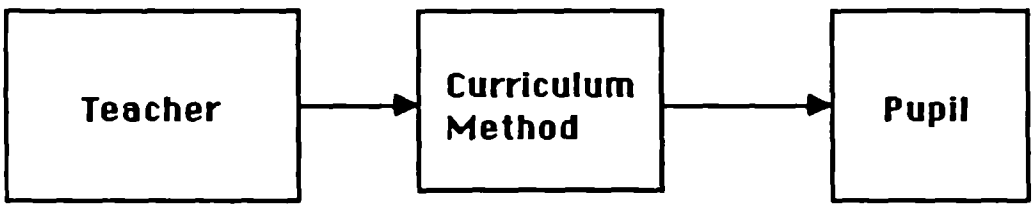


Figure 2.3 Tyler's Curriculum Model

Newer approaches, particularly that of Lawton, D. (1973), saw curriculum theory as more complex and involving several different areas of knowledge and fields. He saw the curriculum as being influenced by sociology, philosophy and psychology (as depicted in Figure 2.4).

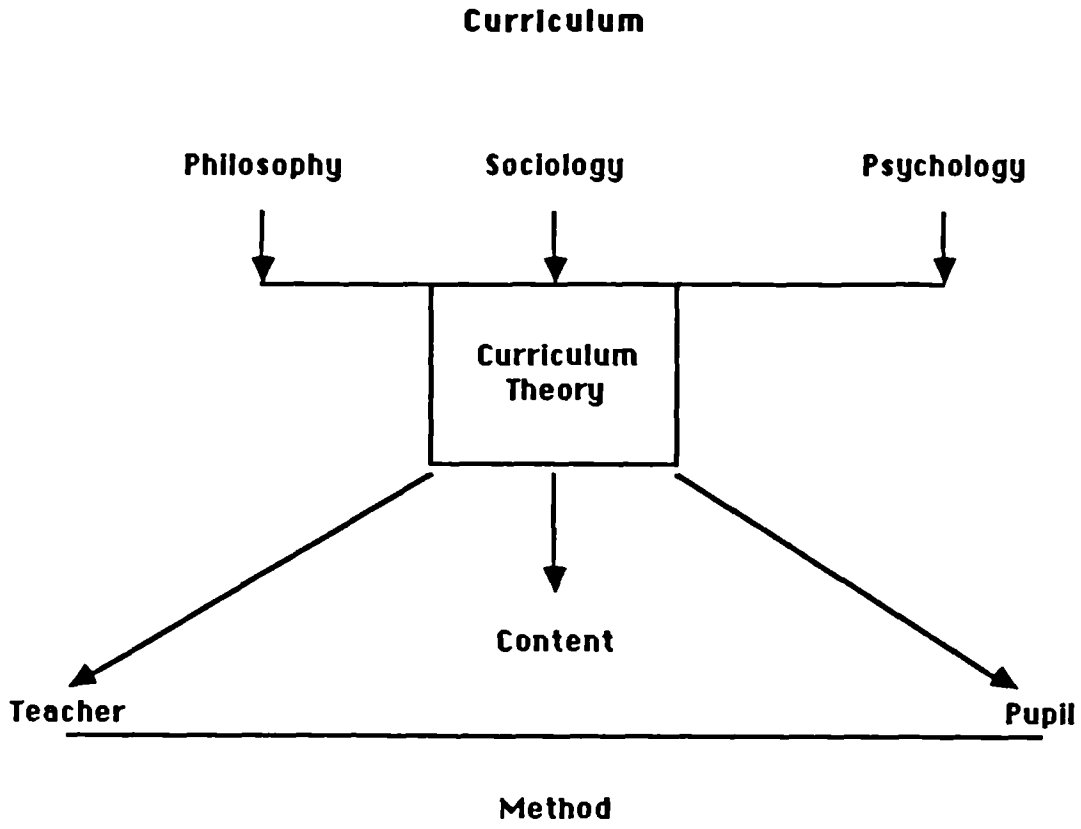


Figure 2.4 Lawton's Curriculum Theory Model

According to Lawton, this perspective took into account the entire teaching context of teachers and pupils : their role as defined by society, the school, and their own self-image, their social background and ability. It also took into account the content of the curriculum and how this was influenced by the philosophical ideas of the structure and organisation of knowledge, the sociology of knowledge, and psychological factors such as child development and theories of instruction. Each of these areas have been further developed by others.

Bernstein, B. (1971) saw educational knowledge as a regulator of the structure of experience. How a society selects, classifies, distributes, transmits and evaluates the educational knowledge it considers to be public reflects both the distribution of power and the principles of social control. According to Bernstein, educational knowledge can be realized through what he terms 'three message systems' of curriculum, pedagogy and evaluation. These are the three

channels through which educational knowledge is transmitted - curriculum defines what counts as valid knowledge, pedagogy defines what counts as a valid transmission of knowledge, and evaluation defines what counts as a valid realisation of this knowledge on the part of the taught. These then give rise to, what he calls, educational codes, which refer to the underlying principles which shape curriculum, pedagogy and evaluation, and which reveal both the distribution of power and the principles of social control.

In his comments on the curriculum, Bernstein introduces the notion of 'classification' which does not refer to what is classified but to the relationships between contents. Where classification is strong, contents are well insulated from each other by strong boundaries. Where classification is weak, there is reduced insulation and boundaries between contents are weak or blurred. He uses the term 'classification' to refer to the strength of the boundaries between contents, and thus to the degree of boundary maintenance between contents.

Bernstein saw pedagogy, the second of his three message systems, as the way in which the curriculum is transmitted. Just as he developed the idea of 'classification' to indicate the strength of the boundaries between the content of knowledge, so he introduces the concept of 'frame' which refers to the range of options available to teacher and taught in the control of what is transmitted and received in the context of the pedagogical relationship. The strength of framing (i.e. the boundary strength) therefore refers to the degree of control teachers and pupils possess over the selection, organization and pacing of the knowledge transmitted and received. Therefore, where the framing is weak, the child rather than the teacher, controls the selection and organization of his learning and the time-scale over which he works. Frame can also be seen in the variation of boundary strength between educational knowledge and everyday community knowledge of teacher and taught (i.e. school and non-school knowledge). The remaining message system, evaluation, is a function of the strength of classification and frames. These can vary independently of one another.

There are also different views expressed with regards to the people and process involved in the transmission of educational knowledge in schools (which in most cases are carried out by

teachers). According to Musgrave, P.W. (1965) and Lacey, C. (1977), teaching is both an activity and a status. They referred to the term 'teaching' as what teachers do at work within educational establishments as well as referring to their membership of an occupational group. They emphasized the fact that just as schools have histories, teachers also have biographies which need to be considered in any study.

Another model of the organisation of schools is one that views the way in which work is done within the school (Stenhouse, L., 1975; Davies, B.,1976). In this model, all organisations are viewed as having 'raw materials' (a term used by Perrow, C., 1970) from which the finished products have to be produced. Thus, the school is seen as a 'factory' from which the technology used by the school will be dependent on what is known of the raw material. The character of the work that needs to be done determines how decisions are made within the school. According to this model, for some schools, teachers might know the 'type' of pupils that are coming in (i.e. the type of raw material) and will have a clear idea as to the kind of educated pupils they would like to 'produce'. It is important to note that in this model, schooling is seen as a way of preparing the children to enter different occupations, according to the needs of industry and commerce and with the preparatory skills which are demanded by the economic system. Education is thus seen by some, including Shipman, M.D. (1975) and Lawton, D. (1975), as being able to influence the development of the economy through its effects upon the social, physical and intellectual skills of its products, i.e. its children .

2.1.3 Theories/Models Used

The interplay between teacher strategies and the adoption/rejection of an innovation must be seen in the light of the department and school, and this in turn must be seen in the context of educational structures and systems. In this research, it provided us with the problem of showing the inter-relationship of those various people, at various levels, who were involved in an innovation in a school. Lundgren's "Frame Factor Theory" provided us with a conceptual tool to identify the different levels that exist in the educational system, and to identify the different

aspects of the organisation that are influential to teacher activity, for example, the teacher's use of computers, as examined in the present study.

Another problem was that of representing the various strategies along with the leadership styles embedded in these strategies that were used by the various change agents, especially that of the decision and policy makers. The categories formulated by White and Lippitt (1968) on leader behaviour and member reaction were found to be appropriate in representing the leadership styles of the various change agents. An aspect of Lewin's Force Field Model (1952) was then used to dynamically represent the interplay of the various factors that were involved in an innovation. It is a form of representation that is dynamic in that it shows the magnitude and direction of the factors in an innovation, that is, whether it was towards adoption or rejection.

2.1.3.1 The Frame Factor Theory

The Frame Factor theory is a sub-theory (Lundgren, 1982) which attempted to explain one part of the relationship between what goes on in classrooms and how it is affected by its broader context. It is a conceptual apparatus that relates the economic, social and political structure of society to the teaching process. Lundgren, U.P. (1972) proposes a model of the pedagogical process which places the organisation as central to the analysis. It is a means of viewing organisational measures not as determining but as limiting educational processes. The concept of "frames" was introduced by Dahllof (Lundgren's former teacher) to link explanations on the macro-level to those on the micro-level. As Dahllof, U.S. (1971, p75,76) explained,

" In this connection it seems necessary, on the stimulus side, to distinguish on the one hand between such general environmental factors as national, regional and cultural characteristics of the population, school organisation at large, etc., and on the other hand, such characteristics of the environment in which the instruction is going to take place that are under the direct control by the school authorities (not by the single teacher) and thus be manipulated by them, but which at the same time are decided on for a rather long period. Such factors then act as fixed frames for the teaching during a whole school year at least and, if of any importance at all, influence the teaching process either by promoting it or inhibiting it. Although even general environmental factors, as well as the characteristics of the individuals (teacher and pupils) who are interacting in the teaching situation, may be regarded as frames for or determinants of the educational process, we prefer to designate the factors mentioned above as direct frame factors or simply as frame factors..... Thus these frame factors have in common that they set certain time and space limits for that part of the educational process that takes place at school."

As he was referring to a centralised system of education, Lundgren defined frame factors in a different way to include measures taken by the State to regulate time, space and personnel. In Lundgren's (1977, p92) terms, frames are,

"....factors that are products of decisions about the organisation of teaching and that limit the possible options for action".

Frames, as used by Lundgren, are boundaries which are established at different levels above the teaching process. The three levels or units identified are :

1. The teaching level/unit.
2. The school level/unit.
3. The educational system level/unit.

The decisions made at level (3) will thus be the frames for decisions on level (2) and (1); and the decisions on level (2) will act as the boundary for any possible decisions on level (1). In some situations, some aspects may act as fixed factors; in other situations, they may be variable and open to manipulation. For example, class size is a variable factor at level (3) but a fixed frame at level (1).

Lundgren (following Dahllof) viewed the teaching process as context bound. It is seen as being determined by rules that regulate (the formal-rule system), frames that form a boundary (the frame system) and goals that govern (the goal system) the teaching process. The links between the various systems are shown in Figure 2.5. The link between the teaching process and that of the organisation of the school as analysed by frames, is one that is looked at in particular in this research study.

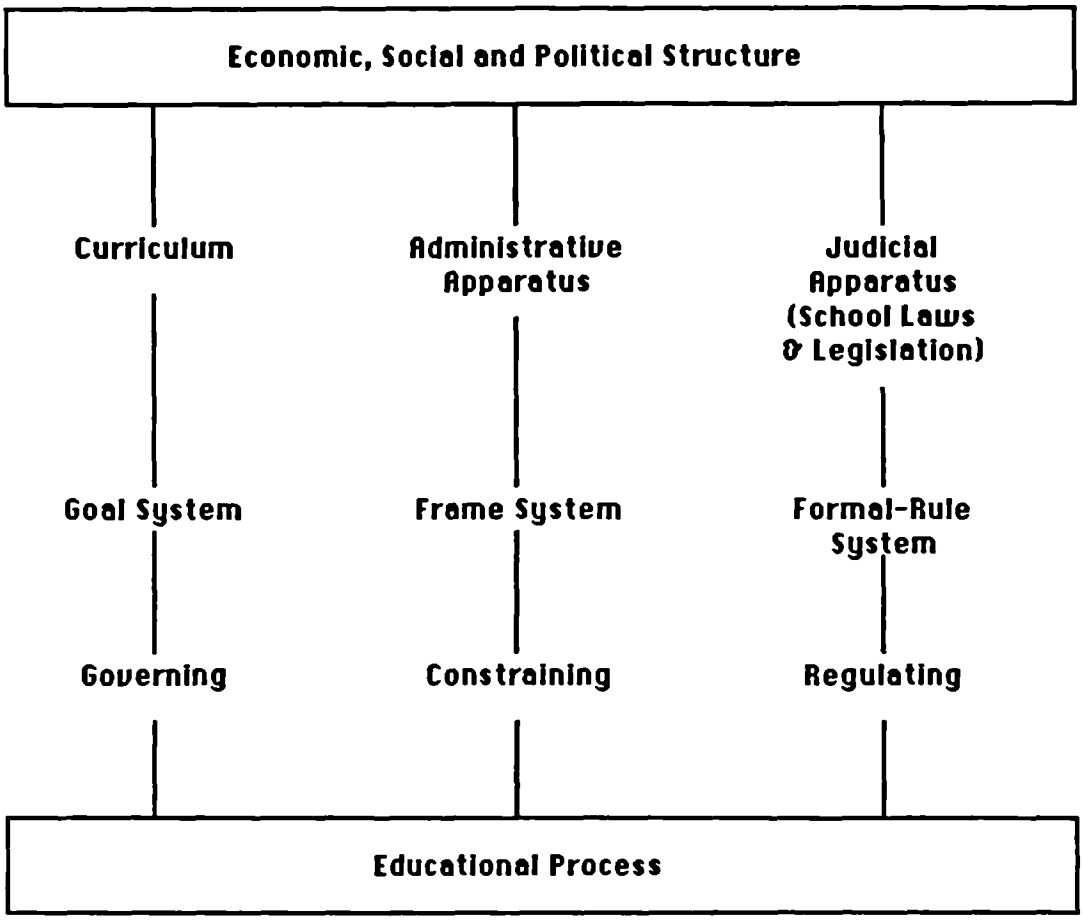


Figure 2.5 Lundgren's Frame Factor Theory

Lundgren, U.P. (1977, p36) further defines the three systems :

"The Goal System includes the concrete consequences of a specific curriculum, i.e. the syllabus, recommendations for teaching, teaching materials, textbooks etc.

The Frame System includes everything that constrains the teaching process that is determined outside teaching. This would include physical equipment such as rooms, organisational arrangements such as size of school and class, ability grouping, time available for teaching etc.

The Formal-Rule System includes regulations of a legislative nature concerning the duties of a teacher such as marking systems, and rules concerning the employment of teachers such as the required number of lessons per week, and demands on competency."

These three systems are thus socially defined and are brought to bear on the teaching process as a matter of school organisation. They are the products of decision making at the institutional and societal levels. Teacher perception, pupil role and the structure of teaching itself are formed by the interplay of these governing, constraining and regulating factors. Thus, according to Lundgren, the educational process is linked to both the pedagogical conceptual structure and the psychological conceptual structure.

The Frame Factor theory is only a first-step in the process of identifying and mapping out those aspects and areas that contribute to our understanding of how teaching is done and why it is carried out in the way it is. It should be noted that frames are perceived differently by different people at different levels. Furthermore, what one teacher perceives as constraining may simply be seen as a reason for action or just a temporary restriction to another. These differing perceptions cannot be easily reflected in the model given by Lundgren but should be borne in mind when looking at the different factors shown in the model.

2.1.3.2 White and Lippitt's Leadership Styles

In the case of a research study of an innovation in schools, the strategies and models of innovation as introduced by Chin and Benne and by Havelock have, embedded within them, the leadership styles of the change agents. It is these leadership styles that influence the kind of strategies that are used. Although White and Lippitt's study was on youth clubs, the categories formulated by them on the leadership styles of the youth leaders and the corresponding reactions of the club members to these styles was found to be appropriate in describing the leadership styles of the change agents and the corresponding reactions from the people affected by the strategies used by these change agents. The three leadership styles defined by White and Lippitt were the "authoritarian" (which, in this study is used synonymously with the word "autocratic"), "democratic" and "lassiez-faire" styles. The characteristics of these styles and the corresponding group behaviour from these styles is best summarised in Figure 2.6.

CHARACTERISTICS OF LEADERSHIP STYLES (WHITE AND LIPPITT)

AUTOCRATIC	DEMOCRATIC	LAISSES-FAIRE
1. All determination of policy by the leader.	1. All policies a matter of group discussion and decision, encouraged and assisted by the leader.	1. Complete freedom for group or individual decision, with a minimum of leader participation.
2. Techniques and activity steps dictated by the authority, one at a time, so that future steps were always uncertain to a large degree.	2. Activity perspective gained during discussion period. General steps to group goal sketched, and when technical advice was needed, the leader suggested two or more alternative procedures from which choice could be made.	2. Various materials supplied by the leader, who made it clear that he would supply information when asked. He took no other part in work discussion.
3. The leader usually dictates the particular work task and work companion of each member.	3. The members are free to work with whomever they chose, and the division of tasks was left up to the group.	3. Complete non-participation of the leader.
4. The dominator/leader tended to be "personal" in his praise and criticism of the work of each member; remained aloof from active group participation except when demonstrating.	4. The leader was "objective" or "fact-minded" in his praise and criticism, and tried to be a regular group member in spirit without doing too much of the work.	4. Infrequent spontaneous comments on member activities unless questioned, and no attempt to appraise or regulate the course of events.
LEADERSHIP STYLES AND GROUP BEHAVIOUR UNDER THESE STYLES		
1. Can create much hostility and aggression (for example, aggressive demands for attention, destruction of property), including aggression against scapegoats (i.e. concentration or polarisation of group aggression against a single "innocent" object or person). 2. Can create discontent that does not appear on the surface. This can create a certain amount of • subdued atmosphere where spirits are damped down and group kept soberly at work; • "comradeship" as they recognise themselves as being in the "same boat". 3. More dependance and less individuality.	1. More efficient than autocratic and laissez-faire (in terms of achieving "work" and "social" goals). 2. More interest and motivation shown in work - kept on working when leader left. 3. Higher level of originality or creative thinking. 4. More group mindedness, friendliness and mutual praise.	1. Less organised (they played more), less efficient (less work done and poorer work); less satisfying. 2. More characterised by play. 3. Group preferred democratic leader.

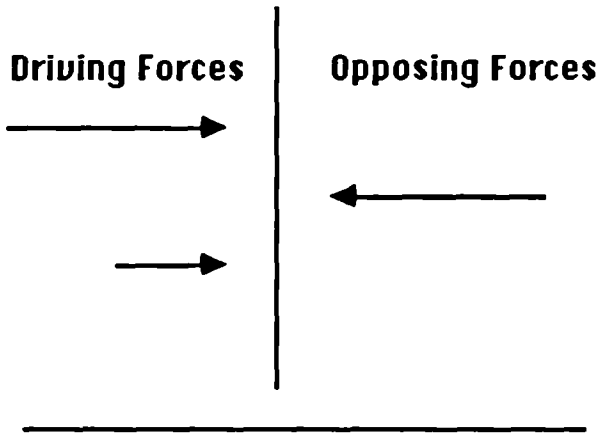
FIGURE 2.5

It could thus be said that the leadership styles embedded in the power-coercive strategy, for example, is an "autocratic" leadership style, and that of the normative-re-educative strategy is a "democratic" style. Similarly, in the rational-empirical strategy is a "lassiez-faire" leadership style . Chin and Benne looked at the way in which different strategies of innovation could be categorised, while Havelock looked at the way in which this innovative knowledge is diffused, as described by his four models. Although White and Lippitt did not look at curriculum innovation, their contribution was to provide a description of the reactions of members who were affected by the different styles of their leaders' strategies, and in-turn, give us an insight into the social interactions involved in the adoption or rejection of an innovation.

2.1.3.3 Lewin's Force Field Model

The factors or frames as postulated by Lundgren, could also be seen as forces that hinder or promote the use of an innovation at the various levels. Lewin (1952) saw behaviour in an institutional setting as a balance of forces (represented by arrows) working in opposite directions. Change takes place when the forces on one side (the restraining forces) are greater than the other (the driving forces), i.e. there is an imbalance of forces. This is shown in Figure 2.7. Such imbalance "unfreezes" the pattern and movement (or change) takes place. An imbalance may occur through a change in magnitude, a change of direction of any one force, or through an introduction of a new force. The process of change consists of three main phases - unfreezing, moving and refreezing. Unfreezing occurs when the possibility of change is created; moving occurs when there is continuous disequilibrium; refreezing occurs when the balance is created around a new equilibrium.

Teachers' Perception of Forces



Change occurs if the balance or resultant of either the Driving Forces or the Opposing Forces becomes greater than the other.

KEY :

Length of line is proportional to the magnitude/strength of force.

Figure 2.7 Lewin's Force Field Model

Lewin's "force fields" could be used to represent the perceptions of the change agents and those affected by them. The driving or opposing forces (i.e. interplay of forces) of an innovation, at the different levels of a system, can thus be represented diagrammatically.

2.2 COMPUTER/CAL INNOVATIONS

Computer/CAL innovations will similarly be looked at in this survey under the three areas described in the previous section, namely :

1. The nature of the innovation, the innovator and the user. An important question to be considered is the perceptions held about the computer and CAL (i.e. using the computer in teaching).

2. The processes involved in the adoption of a CAL innovation, the strategies used, and the stages of the adoption/diffusion of the innovation within the social structure in which the innovation took place.

3. The evaluation of the innovation.

Areas (2) and (3) were taken together as the evaluation of a CAL innovation and the results of such studies are closely tied in with the processes involved in the innovation and the way in which the research was conducted. Hence, effort was made to describe the methodology used in each of the research studies being surveyed, as this provided the background and context in which the results or findings are seen and perceived. Within these areas, the literature survey was also grouped and analysed according to :

(a). The different groups of people being studied (i.e. pupils/students, teachers/educators, administrators/decision-makers).

(b). The different levels being looked at (i.e. primary/elementary, secondary, higher education/tertiary).

(c). Different aspects of the computer innovation (i.e. hardware, software or system considerations).

These were further distinguished in terms of the two main countries where most of the work had been carried out, i.e. the United Kingdom and the United States of America. It should also be borne in mind that most of the studies in the United States (and especially at the tertiary level) generally assumed that the use of computers in education was in the area of individualised instruction. Hence the term Computer Assisted Instruction (CAI) was used in most US studies. In the United Kingdom however, the computer was normally seen as an aid or adjunct to learning, and hence the term Computer Assisted Learning (CAL) was used in the UK. The literature survey also covered the use of the computer in the area of administration. In addition, the term "computers" used in this survey included both mainframe computers and microcomputers with the general guideline that most studies conducted before the mid-seventies would involve only mainframe computers unless specifically stated.

2.2.1 The Nature of the Innovation (i.e. Computers/CAL as an Innovation), the Innovator and the User

2.2.1.1 Looking at the Teachers and Administrators

School Level - Christopher, G.R. (1969) was one of the earliest workers in this field and concentrated his work on experienced school administrators. His research study tried to determine the effect that an experience with computers would have upon attitudes towards Computer Assisted Instruction. Two groups were selected from a sample of 71 advanced students in educational administration. One group formed the experimental group (28 students) which took the CAI lesson, Computerised Instructional Unit (CIU), while the other group (43 students) did not. Both groups completed a pre- and post-test version of an attitude measurement instrument (with seven days gap between the tests), as well as a background questionnaire. Christopher found that the more knowledgeable administrators were about computers, the more favourable they were towards them. He also found that the CIU experience caused attitudes toward CAI to be more favourable, but not at a significant level.

Robardey, C.P. (1971) carried out his PhD work by looking at whether there was a relationship between the attitudes of teachers and principals towards Computer Assisted Instruction, and

some form of biographic data (for example, knowledge, age, level, type of school and subject taught). This was carried out with 276 teachers and headteachers from whom there was a 92% response in a county in Michigan. According to Robardey, the only significant result which came from the study was that, out of six variables, only 'knowledge of CAI' seemed to be related to 'attitude to CAI'.

Stevens, D.J. (1980) conducted a straightforward survey to assess the knowledge and attitudes of Nebraska K-12 teachers (including faculty and student teachers) with a random sample of 963 teachers. The average response rate was about 60%. He found that Nebraska educators favoured the inclusion of instruction to foster computer literacy among high school students but that they did not feel qualified to teach it. All of them were found to be more knowledgeable about the role computers play in society than about the computer itself (i.e. computer software, hardware and/or programming). There was an uncertainty in most of them with respect to the use of computers in instruction. Over 46% were undecided or did not believe computers would enhance the teaching/learning process.

Stimmel, T.; Connor, J.L.; McCaskill, E.O. and Durrett, H.J. (1981) arrived at a general conclusion that teachers had a natural resistance to CAI. They looked at pre-service teachers' attitudes toward computers and CAI, and used a semantic differential scale which consisted of a set of bipolar adjectives (in a 1-5 scale). 109 students representing five classes of teacher trainees in a science teaching methods course were selected. Stimmel et al discovered that teachers had considerable "negative" or "oppressive" views (derived from the adjectives used by the teachers like "dead, sad and ugly" as opposed to "alive, happy and beautiful", respectively) towards computers and CAI.

Bolton, H. & Mosow, D.K. (1981) conducted a similar study to that of Christopher, and called it an "exploratory" study. It looked at teacher (and pupil) attitudes toward CAI, but specifically in a secondary social studies classroom. The test mainly consisted of pre- and post- assessments of teachers' and pupils' knowledge and attitudes to computers before and after a lecture about the computer (its parts and roles in the classroom) and after participating in a social studies computer

simulation program. Bolton & Mosow claimed (from their pre- and post- assessment) that none of the teachers in the study had any previous experience with computers but that they became more knowledgeable, more experienced, and more at ease with the computer following the one-hour simulation. They found, however, that the teachers' understanding about the meanings of computer-related words (for example, keyboard, floppy disc, menu) remained the same.

Tertiary Level - At the tertiary level, Alderman, D.L. and Mahler, W.A. (1976) conducted a survey where 900 questionnaires were given to faculty members of six community colleges who were involved in two major computer projects (with a 33% response rate). They found that the teachers were fairly open to innovation but guarded their autonomy in making curriculum decisions, in establishing goals, and in testing and evaluating their instruction. The teachers generally thought that CAI would best be viewed as an adjunctive resource due to the importance they placed on interactions with students, and that any technology that would supplant the teacher would be resisted. They did not see the use of computers as a "passing fad". Alderman & Mahler also attempted to group their sample according to specific academic fields and found that the social science teachers were the least positive toward CAI, while the natural science teachers (which included Mathematics) were most positive.

2.2.1.2 Looking at the Pupils/Students

School Level - Beck, J.J. (1979) conducted a similar study to that of Robardey, but looking at the pupils' views of computers and CAI. His survey included five items on general information about the school, plus nine items on the instructional application of computers in each school; a personal data questionnaire which included items like subject, age, sex, grade level and grade point average, previous experience with CAI, current experience with CAI, and amount of time spent at terminal, a Learning Style Inventory, a Bass Orientation Inventory, and two Attitude Scales. Beck found out that the use of CAI in 24 Nebraska high schools was still in a developmental stage and that :

1. CAI did not negatively affect student attitudes toward CAI, or the course of study in which CAI was used.
2. Female students tended to show a significantly higher attitude toward CAI than males.
3. Student grade point average, time spent at terminal, and level of prior experience, did not affect student attitudes toward CAI.

The work that Bolton, H. & Mosow, D.K. (1981) conducted (which included pupils as well as teachers) indicated that most pupils in the study did not have any previous experience with computers but that they became more knowledgeable and at ease with the computer following the one-hour simulation, and that most of the pupils felt that they could learn to use the computer quickly.

Tertiary Level - Mathis, A.; Smith, T. and Hansen, D. (1970) worked with a group of 47 females and 17 males of a general psychology class. They applied two different attitude measurements (including a semantic differential scale), with post and pre- tests, control and experimental groups. Mathis et al came to the conclusion that college students generally had positive attitudes towards computers. They also found that exposure to CAI increased the students' positivity, but that the magnitude of the attitude change was dependent upon the kind of experience they had. For example, those students who had encountered only few errors while working with the program were more favourable to CAI.

Very similar work was carried out by Jones, A. and O'Shea, T. (1982) about twelve years after Mathis et al. They conducted a study to find out why students (at the tertiary level) did or did not make use of CAL tutorials, and the beliefs which they and their tutors held about the educational benefits and practicalities of Cicero (a CAL authoring system developed for use in the Open University and connected to a mainframe computer). The users, their attitudes, the likelihood of using or not using CAL, and their satisfaction with it were looked at. They were examined at three points in time - before using the system, during its use, and after its use. Jones and O'Shea found that perceived educational benefits had little to do with the amount of use of a CAL system. Use was related to a cluster of factors, difficult to disentangle, which

included the time using it and the problems of doing so. Students were realistic about what the system could provide, and, on the whole, what the students thought they gained from using the system matched their expectations. Usage was low because their view of the problems was also realistic. These barriers, according to Jones and O'Shea, could be viewed as a series of concentric circles, of which the first barrier to be encountered was access to the terminal, followed by access to the program, the quality of the program and finally integration with the course.

2.2.2 The Processes Involved in Computers/CAL Innovation

The studies mentioned so far did not look at the social context in which the innovation took place, although some references were made, only in passing, to how the clients saw others or perceived the organisation in which the CAL innovation took place. None of these studies looked in detail, for example, at the form of communication, the management styles of the institutions, or the users' perceptions of their situations (except the study by Jones and O'Shea). There have been other attempts which have tried to obtain a wider picture of the situation in which the CAL innovation took place and thus provide a better understanding of the processes involved. Some of these studies were also very heavily dependent on the survey method and the analysis of the context was obtained rather indirectly via some of the questions asked in the survey, for example, the work by Anderson, R.E.; Hansen, T.; Johnson, D.C. and Klassen, D.L. (1979).

Only a few studies were undertaken to look, among other things, at the different roles emerging as a result of the use of computers in teaching. The review starts with the primary school level in the UK. It is important to bear the level in mind as the curriculum and structure within the primary school setting is very different from the secondary school. This has direct bearing on the way computers are used in the school, and the organisational and managerial issues associated with it.

2.2.2.1 Primary Level

Wayth, P.J. (1981) was Headteacher of a junior school and basically, over a period of six months, recorded his personal observations while trying to introduce the use of computers in his school. He found that most computer courses organised were for the junior level and that they were carried forward by the enthusiasm of an external lecturer. He also approached an external lecturer to teach some of the pupils basic programming skills. Wayth then asked a few teachers to have the computer in their classroom for a week's duration to see what use they could make of it. In the seven teachers who were reported from, there was a mixture of views by the teachers about the use of the computer. Some of them were apprehensive at the beginning, mainly due to a lack of understanding of the capabilities and uses of the computer. Most of them came out with a greater confidence and knowledge of the possible uses of the computer although admitting that one week was insufficient. Some teachers discovered that it involved a considerable amount of time with the pupils (individually or in pairs), and that they encountered problems of siting the computer (and so being able to face the class at the same time), loading of programs, explaining to the children how to use the computer, etc. They also discovered the usefulness of using the computer for administration (for example, to catalogue library books and resource materials).

The work carried out by Elder, R.; Wills, R.; Johnston, M. and Gourlay, J. (1982), was similar to that of Wayth in that an external body was directly involved in providing software and personnel. It was aimed at investigating the organisational and managerial constraints on computer usage in the primary school classroom and to develop software suitable for them. The study was conducted in three phases. Phase 1 was a pilot study whereby the use of the computer was monitored in two "average" classrooms - one in a rural school and the other in an urban school. The computer was placed in a suitable class level in each school where software was already available. Phase 2 was the development and testing of software. Phase 3 was the monitoring and observation of six classrooms in six different schools where the computer had been placed for a complete term.

Elder et al felt that the amount of competence required to run the computer appeared to be minimal, but that the degree of confidence required was a different matter as was the skill in using the computer to optimum advantage. They noted that most of the teachers placed the greatest value on those programs in which the data within a program could be changed to suit the specific class, and on those programs which gave an attractive way of practising number work or spelling. They also found that the majority of pupils had no dislikes, while the remainder tended to have specific subject based dislikes, for example, "I don't like Division because I don't like sums." On the whole, the novelty value of the computer seemed its chief attraction for these pupil users, with the exception of classes where the teacher had made positive efforts both to integrate the programs into classwork, and to provide backup in the form of records, maps etc.

They also found that the physical layout of the classroom played a very important part in determining computer usage as did the teachers' estimate of the general trustworthiness of the class. The position of the power point dictated the placing of the machine. In these classrooms, the computer was an accepted tool for pupils and teachers. Elder et al also began to realise that the one question which occupied both Headteachers and the majority of teachers involved was simply the security of the machine (rather than the safety of the pupils). Control and access were always directed by the teacher except at break times. Certain standards of decorum were expected and in some cases, a "machine minder" was appointed to assist those in difficulty.

Surprisingly, Elder et al found that managerial problems were non-existent save in the cases where an attempt was made to give all the pupils in the school "hands-on" experience. Physically, the computer was readily moved from room to room, carried by the teacher, or an older pupil or the janitor. The organisational problems of sharing a single computer proved to be more difficult than anticipated which, according to Elder et al, would not be a new problem to Headteachers who already had to allocate resources.

They discovered that none of the teachers could claim that the computer freed them to concentrate on other work or other groups. Each teacher found that the computer created more

work, both in terms of classroom organisation and the time needed to collect or alter data. Reservations were made more with respect to curricular timing than content - there was the pressures of teaching, and the sheer difficulty of handling several different, often conflicting demands during every school hour, making decision-making hazardous.

2.2.2.2 Secondary Level

Anderson, R.E.; Hansen, T.; Johnson, D.C. and Klassen, D.L. (1979) conducted a survey (mail questionnaire) of 3,576 secondary school teachers in the area of Mathematics, Science and Business Education. Half of the sample had adopted instructional computing but only a third were still engaged in instructional computing. Anderson et al found that the adoption of instructional computing was more likely to occur :

1. When the computer was seen to be available within the school and to the teacher.
2. When the teacher held attitudes and values favourable to instructional computing.
3. When the teacher had received adequate training (i.e. that the training had adequately equipped the teacher to make decisions about using the computers in teaching as opposed to just the "amount of training").
4. When the teacher was more experienced (i.e. the number of years teaching).
5. When the teacher covered a wide range of grades.
6. In smaller schools.
7. In smaller communities.
8. In locations closer to the central computer.

These research findings were based purely on a quantitative analysis of the questionnaire and no explanations were sought from the teachers as to why these reasons were given.

Sledge, D.K. (1981) conducted work at two secondary schools with the aim of identifying areas of the school curriculum and administration suitable for computer application. Another aim was to develop and evaluate appropriate software. Among other things, Sledge found that school

staff would not necessarily be interested in computers even if a computer was available. Instead, a "sell" approach, according to Sledge, needed to be adopted if a wider involvement by teachers was wanted. Sledge also felt that software should be produced by software experts (and not teachers). In the area of administration, he found that one of the problems was the logistics of sharing the computer resource between teachers and administrators. Sledge (p44) commented that,

"No matter how favourably set are the microcomputer factors (equipment, software and support), it is the complex chemistry of the school itself that will ultimately determine the outcome of the microcomputer in the school".

Sledge only commented in passing about the role that senior teachers played in the introduction of computers in the schools (i.e. that they needed to provide support), but did not look into the actual interplay of management and decision-making styles between senior teachers and teachers, and how that affected teachers' attitudes and use of computers in the schools.

2.2.2.3 Primary and Secondary Level

Another group of researchers who are interested in the use of computers in mathematics education is the ITMA (Investigations on Teaching with Microcomputers as an Aid) Collaboration. (The ITMA Collaboration include Benzie, D.; Burkhardt, H.; Coupland, J.; Field, G.; Fraser, R.; Phillips, R.J.; Pimm, D. and Ridgway, J.). An observational study was conducted by them (Phillips et al, 1983; Ridgway et al, 1983) which involved 15 secondary teachers (mathematics trial) and 15 primary school teachers (primary trial) who were using a computer as a teaching aid every week for a term. These teachers attended a weekend in-service course at which the project was discussed and where support materials were provided consisting of software (97 programs in all), instructions on computer fundamentals (plugging the computer, loading programs etc.), and program notes (abstract, teaching suggestions). It was recognised that the teachers observed were atypical of teachers as a whole as they were likely to be more committed to the use of computers in school, to be more knowledgeable about computers,

and, since they were volunteers in a new area, more self-confident, and probably more competent.

Phillips et al (1983) specifically examined the problems and benefits of using computers as a classroom teaching aid (i.e. the fact that it does not replace the teacher but supplements the lesson) as opposed to tutorial use. The paper focused on the ergonomic aspects of computer aided teaching and provided recommendations to :

1. Teachers (for example, type and location of television/monitor).
2. Education Authorities (for example, provision of suitably-sized television monitor, technician support to service and adjustment of monitors).
3. Program & Documentation Designers (for example, coping with keying mistakes, screen design/layout).
4. Hardware Manufacturers (for example, key layouts, large keyboard buffer, providing choice of large character sizes).

The educational aspects of computer aided teaching and the recommendations made for the design of teaching units which arose from this study were covered in an accompanying paper by Fraser et al (1983). These included recommendations of specific design considerations such as:

1. Concentrating on the pupil learning activities that the designer wished to promote.
2. Leaving the most important aspects to be done by the pupils with pen & paper.
3. Balancing between the capabilities (or power) of the program and the ease of use of the program.
4. Allowing new possibilities and materials for use within a program.

They also came to the conclusion that the computer was regarded by the pupils as a "personality" that was an assistant to the teacher and which allowed the teacher to take on different roles, including a more consultative and counselling role.

The ITMA team (Ridgway, 1983a) also looked at the teaching applications of CAL in mathematics lessons. This paper looked at the four specific programs that were most popular and most used by the teachers, and how they contributed and affected the lesson. They noted that the programs freed the teacher from the role of expositor, that discussion was facilitated in many of the classes, and that problem-solving strategies were used and skills developed. It was found however, that investigations and practical work were not stimulated as a result of using CAL. All these studies also found that their pupils were enthusiastic towards using the computer. Some of the pupils however, were frustrated by computer errors, and some of the pupils valued the teacher's time more than the computer's time.

These studies conducted by the ITMA Collaboration were focussed largely at the level of the classroom, i.e. at the styles of the teachers and the reactions of the pupils and the classroom management issues involved at that level. No references were made by the research team however, to the roles of the heads of departments or headteachers and how they affected the use of computers in the department or in the school.

Sheingold, K.; Kane, J.H. and Endreweit, M.E. (1983) looked at CAI/CAL innovation at four levels - the community, the school system, the individual school and the classroom, selecting three local educational authorities which had significant computer use at both the elementary and secondary levels. They also looked at the type of management structures within the three school systems and the way in which resources were distributed. A four member team of researchers spent a week in each community, interviewing, observing computer use and collecting information from local documents about instructional computing. In all, eighty teachers, thirty students, twenty-four school administrators, fourteen district administrators, eight technology specialists and ten community persons were interviewed.

One of the education authorities served as a model where the authority and resources were centralised. Computer software was financed and produced at the central level to meet the specific needs and goals of the district. In the high schools, Sheingold et al noted that the

computers were used to teach programming and computer literacy, whereas in the lower grades, they were used as an instructional tool for practising arithmetic skills. In most of the elementary schools, the computers were located in a resource room.

The second education authority was an authority where some resources and authority were centralised, but in which the actual use of computers and decisions about their use were decentralised. The education authority was within a state which had an organisation to provide the computer services. This organisation provided teacher training, offered computers at discount prices, developed and evaluated software and made it available to their public schools at no cost. The initiative for getting computers into the individual schools however was taken by individual teachers and in some cases, media specialists. In this authority, they found that most of the teachers stressed the need for more time to learn about using computers. There were however, no generally accepted models for making time available to the interested teachers. Sheingold et al perceived that teachers felt computers were making a difference to students, but few of the teachers talked of learning outcomes. They also noted that most of the computers at the elementary level were located in resource rooms and not in classrooms. Such locations provided access for as many children as possible to the limited number of computers but placing the computers outside the classroom, it was speculated, avoided the challenge of integrating the computers into the classroom and curriculum. Another phenomenon that they found was the rise of student experts - students who sometimes assumed the role of the teacher with other students and occasionally did the programming for teachers.

In the third education authority, Sheingold et al noted that most authority was delegated and initiative taken at the grassroots level. There were no comprehensive policies or plans for the technology to be used, and decisions about actual use were decentralised. The most significant form of support for computers from the district was through in-service courses, or through computer training courses which teachers were paid to attend. Software was acquired in various ways, primarily from inexpensive sources like magazines or other school systems. This education authority, it was noted, showed the emergence of a new role within the school - the computer buff - the teacher who was knowledgeable about the technology and had invested a

great deal of personal time in becoming so. At the elementary level, the computers became part of the classroom and teachers had varied goals for their use. Their use however, seemed to lack integration with the curriculum and most of the teachers felt they needed to master the computer first before thinking about ways of using it productively in their teaching. At the secondary level, they found that the computer was located in the classroom of the Mathematics or Computer Science teacher which meant that when teachers in other subject areas wanted to use it, class locations had to be switched. This was considered a major task in itself which had to be planned well in advance.

2.2.2.4 Tertiary Level

Pengov, R.E. (1977) looked at the key individual, social and innovation variables influencing the diffusion of CAI in a medical faculty, making a comparison between two groups. He modelled his work on that of Rogers & Shoemaker. 72 faculty members (83% response rate) completed the 13 page, 252 item questionnaire. For each faculty member who had authored CAI materials, a faculty member who had not authored CAI materials was matched as closely as possible by rank, tenure, age, degree and number of years at the university. Pengov found that :

1. The CAI group had significantly different attitudes toward teaching, for example, the CAI group focussed more on the individual student.
2. Adequate computer resources and instructional programming support personnel were necessary before faculty members adopted CAI. Indirectly, the quantity and quality of resources provided was perceived as a statement of the relative value of the innovation to the organisation.
3. The actions and involvement of potential adopters were greatly affected by the people and resources to which the adopter was initially introduced.
4. The CAI group considered CAI to result in increased student learning and involvement, which led to or required other changes or practises.

2.3 CONCLUSION

The relevant research studies done in the area of CAL/Computer innovation can be fitted and discussed within the framework of curriculum innovation models of change and strategies mentioned in the previous sections. This, together with the main research findings and tools used, are summarised in Figure 2.8.

Of the sixteen research studies examined, ten of these used the questionnaire or survey method as their main research tool to obtain their findings. These included extensive use of attitudinal questionnaires plus biographical and knowledge-acquisition-based questionnaires distributed to, in certain cases, very large sample sizes. Pengov, for example, used a 13-page 252 item questionnaire with key variables grouped into three domains of individual, social and innovation variables; while Anderson et al's questionnaire was mailed to 3,576 secondary school teachers. Two of the research studies used the semantic differential scale technique which was a tool used to discover the attitudes of teachers towards computers and CAI (one research study used this together with the questionnaire technique). Finally, five of these studies was based on observation work and interviews, mainly in classrooms.

All but four of these studies looked at the Interactive and Consequent stages of a CAL/computer innovation, i.e. they looked at the stages where the innovation was introduced and the impact which the innovation had. Two of these studies (Wayth, Sledge) had looked at both the Antecedent and Consequent stages. One (Elder et al) looked at all three stages and another (Stimmel et al) looked at only the Antecedent stage. Stimmel's work was particularly helpful as it, for example, noted the attitudes of pre-service teacher trainees in a science methods course before they were involved in any computer innovation in a classroom. Stimmel et al found that these trainee teachers already had negative views towards computers and CAI.

Of the sixteen studies, only five of the studies examined the strategies and models of change that they had employed in introducing the use of computers and CAL. Four of these studies, however, took a direct interventionist approach by providing computer specialists who

sometimes took a consultative role in the innovation and had an artificial "input" of hardware and software (to varying degrees) so that some form of analysis of the research could take place. The research studies were thus more of the Problem-Solver (PS) model of change with a Normative-Re-educative (NR) strategy. One of the four studies (Elder et al) was, in effect, a Linkage model of change as the different combinations of models of change were applied at different phases of the research work; another (ITMA) employed a Power-Coercive strategy for their research work as their own software and training resources were provided for the teachers involved in the study (although consent was given by the teachers involved). Only one of the sixteen studies (Sheingold et al) observed the types of strategies used and the models of change being at work in a computer/CAL innovation and was not directly involved in the innovation itself.

This sample of research studies reviewed is fairly representative of the research work that has taken place in the area of CAL in education, in that the majority of CAL research had taken place in the USA. For example, in this review, eleven of the sixteen studies were conducted in the USA. In addition, most of the research done in the States concentrated on the secondary and tertiary level, whereas in the United Kingdom, most of the studies had been conducted at the lower secondary and primary level. In this review, of the eleven studies that were conducted in the States, eight were based at the secondary level and three at the tertiary level. In the UK, on the other hand, of the five studies done, only one was at the tertiary level and one at the secondary level. The work by the ITMA team concentrated mainly at the primary level, although some work was carried out at the lower secondary level.

From the review, it could be seen that most of the research work done tried to relate the attitudes that teachers had towards computers and CAI/CAL to either biographical factors or to a prior experience that the teachers might have had, and to see whether this might have led to a more positive or negative attitude towards computers and CAI/CAL. Some of these studies included those of Robardey, Bolton & Mosow and Wayth. Bolton & Mosow and Wayth showed that a CAI experience led teachers to be more knowlegeable, at ease, and confident with computers. Robardey only found that knowledge of CAI was related to attitude to CAI, but did

not however indicate the direction of change of attitudes for those who had a knowledge of CAI. Christopher did a similar test on school administrators, and Beck and Mathis et al conducted it on students. Christopher and Mathis et al found that their target groups had a more favourable attitude towards computers after a CAI experience, with Mathis et al discovering that the magnitude of change was dependent on the type of experience they went through (a view also found by Jones & O'Shea). Beck, on the other hand, only came to the conclusion that the CAI experience did not have a negative effect on students' attitudes.

Other studies (including those by Stevens, Stimmel and Anderson et al) only did a straightforward survey of teachers' attitudes towards CAI. Stevens found that teachers felt favourably towards the introduction of computer literacy (but did not feel qualified to teach them). In the same light, Anderson et al found that teachers would adopt CAI only when adequate training was received. Similar conclusions were made by Wayth, Elder et al, Sledge, ITMA and Sheingold from their observations of the classrooms. They began to realise that teachers saw time as crucial and that they needed to be able to learn how to use the computer first. In addition, Elder et al felt that the amount of competence required by teachers was minimal but that the degree of confidence they needed was a different matter.

Other findings included the fact that teachers were not interested in computers even when computers were available (Sledge); that social science teachers felt less favourably towards computers than natural science teachers (Alderman & Mahler); and that female students were more favourable towards CAI than male students (Beck).

Eight of the sixteen studies also looked at the organisational issues involved in implementing or using computers in a classroom and school (but at varying depth). The main organisational factors that were mentioned had to do with the provision of adequate computer resources (hardware and software), and the siting of the computers which indirectly affected the teachers' anxiety over the security of the computers and the problems of integrating computers within lessons. The work by the ITMA Collaboration led to extensive recommendations by the team on the hardware, software and ergonomic aspects of CAL. The study by Anderson et al and

Research Study	Year	Level	Research Tools	Strgs & Models?	Stage Looked	Main Focus	Main Findings
1. Christopher G.R. (USA)	1969	Sec	Att. & Bckg. Questn	No	I	Admintrs	1.More knowledge about comps. means more favourable. 2. CAI experience led to a more favourable attitude.
2. Robardey C.P. (USA)	1971	Sec	Att. & Biog. Questn	No	C	Teachers	1. Knowledge of CAI related to attitude to CAI.
3. Stevens D.J. (USA)	1980	Sec	Att. & Knldg. Questn	No	C	Teachers	1. Favour introduction of comps. but do not feel qualified to teach it.
4. Stimmel T. et al (USA)	1981	Sec	Semantic Diff. Scale	No	A	Teachers	1. Negative views towards comps.
5. Bolton & Mosow (USA)	1981	Sec	Att. & Knldg. Questn	No	I	Teachers Students	1. CAI experience led to knowledge and ease towards comps. 1. CAI experience led to knowledge and ease towards comps.
6. Alderman&Mahler (USA)	1976	Ter	Att. Questn	No	C	Teachers	1. Guarded their autonomy. Saw CAI as adjunct to teaching. 2. Social science teachers less positive towards CAI than natural sc. teachers (incl. Maths).
7. Beck J.J. (USA)	1979	Sec	Att. & Biographic Questn	No Data	C	Students	1. CAI experience did not negatively affect students views towards comps. 2. Female students more favourable towards CAI than males.
8. Mathis A. et al (USA)	1970	Ter	Questn; Semantic Diff.	No	C	Students	1. Students generally had positive views towards comps. 2. CAI experience led to more favourable view but magnitude dependent on type of experience.
9. Jones & O'Shea (UK)	1982	Ter	Att. Questn	No	I	Students Org.	1. Use was related to the time needed to use it. 1. Problems included access to terminal, programs, and integration to course.
10. Wayth P.J. (UK)	1981	Pri	Obsrvs; Interviews	Yes (PS model with NR strategy)	A ; I.	Teachers Org.	1. CAI experience led to greater confidence. 2. More time needed 1. Siting of computer and loading of programs a problem.
11. Elder R. et al (UK)	1982	Pri	Obsrvs; Interviews	Yes (Linkage model with NR strategy)	A ; I ; ; C	Students Teachers Org.	1. No dislikes towards comps. 2. Novelty value except when teacher puts in effort. 1. Amount of competence required minimal but degree of confidence a diff. matter. 2. Teachers' estimate of trustworthiness of class important (tied in with security of machine) 3. Value placed on software where data could be changed. 4. More time needed; pressures of teaching; curricular timing. 1. Physical layout of classroom, siting of power point important.
12. Anderson et al (USA)	1979	Sec	Att., Biog. & Knowledge Questn	No	I ; C	Teachers Org.	1. Would adopt CAI if attitudes are favourable towards instructional computing, when adequate trg. is received, when teacher is more experienced in teaching 1. Would adopt CAI when computer is seen to be available, and in smaller schools.
13. Sledge D.K. (UK)	1981	Sec	Obsrvs; Interviews	Yes (PS model with NR strategy)	A ; I	Teachers Org.	1. Staff not interested in comps. even when comps. were available. 2. Senior staff needed to provide support. 1. Providing adequate and appropriate software is essential.
14. ITMA Collab. (UK)	1983	Pri; Sec.	Obsrvs; Interviews	Yes (PS model with PC strategy)	I ; C	Students Teachers Org.	1. View comps. as assistants to teachers; facilitated discussion and increased problem-solving skills. 2. Enthusiastic about computers. 1. Comp. freed them from role as expositor and allowed them to take on diff. roles. 1. A series of recommendations given ranging from software design, hardware issues and ergonomic aspects of CAL.
15. Sheingold et al (USA)	1983	Sec	Obsrvs; Interviews	Yes (Looked at diff. strategies and models)	I ; C	Students Teachers Org.	1. Rise of the student experts who did programming for teachers. 1. Rise of the teacher computer buff. 2. More time needed to learn to use comps. Teachers felt they needed to master them first. 3. Perceived that using comps. made a difference to students but did not talk of learning outcomes. 1. In some schools comps. were located at resource room to facilitate access but also avoids problem of integrating it in within the curricula; while in others, comps. were in classrooms but teachers did not know how to intergrate them.
16. Pengov R.E. (USA)	1977	Ter	Att. & Knowledge Questn	No	I ; C	Teachers Org.	1. Those who had authored CAI materials had different attitudes to teaching (focussed more on individual student); and saw CAI as helping learning. 2. Greatly affected by initial introduction to computers. 1. Adequate comp. resources must be provided before adoption can take place.

Figure 2.8 Summary of Relevant CAL Innovation Research Studies

Pengov showed that in order to understand CAL, it was necessary to go beyond technological factors, for example, amount and availability of hardware and software (although it was necessary before any real use can take place) and to look at the social factors at the individual, occupational, institutional and community levels as well. However, they themselves did not embark on a closer or more detailed study of these levels.

Most of the work done did not look at the strategies and management styles of the policy and decision makers within an institution, especially within the organisation of a school, and the interaction between these decision-makers and the teachers, who were the ones expected to implement this innovation.

Only two of these studies were labelled as "case-study" approaches (Sheingold et al and Elder et al) in that they felt that they conducted a detailed examination of the classroom and school situation where the innovation had taken place. Mishler, E.G. (1979) stressed the need to understand the context of each innovation. This has led to a more fundamental exploration of the meanings of an innovation and the emphasis of understanding an innovation in the context of the situation and environment that it is in, i.e. within the context of the case.

This research study will thus address some of these issues that have been deficient in the CAL research studies conducted so far, in particular, that of providing an understanding of how teachers perceive computers within their organisational setting, and how the management and leadership styles and strategies of decision makers within the organisation of a school promote or hinder the implementation of computers.

CHAPTER 3 : RESEARCH METHODOLOGY

3.0 RATIONALE

In order to understand a situation where computers were being introduced into a number of departments in the school, it was considered necessary to be within the school to observe and chart the history of this implementation. More importantly however, it was crucial to be able to talk to the teachers involved in this implementation, as individuals, and so to have a better understanding of the opinions of these teachers towards computers and computers in teaching.

Teachers, however, are not alone. They are within departments which, in-turn, are within the organisational setting of a school. These departments are run by department heads who not only have their own perceptions about computers, but also have views and opinions on how they see the management of people and resources within their department, and in this case, the management and use of computers in their departments. It would be helpful to explore the extent to which these department heads shape and influence the teachers within their departments. In addition, this analysis was extended to the level of the school, to understand the strategy adopted by the Headteacher in introducing computers into the entire school, and to see whether it had any influence (and to what extent) on the department heads and teachers. It is noted by the researcher that it would be helpful to see how all these would eventually affect the actual pupils, but due to the limitations of time and resources, it was decided that the research would not include the pupils' perceptions of computers and the use of computers in their lessons.

It was also necessary to see which factors, or combinations of factors, were more dominant in the eventual takeup or non-takeup of computers within the school. This meant that we had to look at the situation in the school some time later. A period of one and a half years was then chosen to obtain a picture of the uptake of computers within the departments and within the school.

Thus, in order to get an overall picture of what influences were at work in the uptake of computers, a description of the various levels of the school and how they interacted with each other was considered necessary. For this reason, a case study was used (this is discussed further in section 3.2). The case study allowed the possibility of looking at the teacher as an individual, that is, how he or she saw computers in general and how they reacted to them in terms of their teaching. It also looked at teachers within departments and sought to describe how they functioned as a group of people, with the dynamics that motivate such groups. And lastly, it sought to understand how departments fitted within the general pattern of the school and the policies of the Headteacher. So the study was designed to tackle the problem of implementation of computers in the school at three levels - the individual, the department and the school, and to attempt to articulate how these levels influenced each other.

3.1 RESEARCH QUESTIONS

Attitudes develop over time and as a result of a range of experiences. In particular, attitudes towards computers and the use of computers are possibly influenced by the prior knowledge a person has about computers, or the lack of it as the case might be. It was therefore necessary to map out which elements in a teacher's attitudes were critical in determining both how they reacted in general to computers and more importantly, how they reacted to them in teaching.

1. What are the different aspects within a teacher's attitude towards computers and computers in teaching that go towards determining the actual uptake of computers in teaching ?

2. Is it possible to see any relationship or combinations of relationships between these aspects that make the uptake of computers in teaching more critical ?

Teachers operate within the social structure of a department (and that within a school), and so their attitudes and perceptions interact with other factors, such as, other teachers' attitudes and perceptions, styles of leadership of the heads of departments and also that of the Headteacher.

Within this social structure, there are organisational constraints and solutions which can have direct or indirect - influence on the actual uptake of computers.

3. What factors, or combination of factors, are important in determining the uptake of computers in a given department ?

4. Do these factors, or cluster of factors, vary from department to department ? If so, is it possible to identify why there are these differences ?

5. Can particular organisational constraints be identified ? (This could be important for planning or for inservice training).

As mentioned above, departments are within the organisation of a school and, as such, under the leadership of the Headteacher. Thus, additional issues are raised.

6. What additional school factors (outside of the departments) are involved in determining the uptake of computers within the school ?

Finally, all these various factors at the different levels are looked at as a whole.

7. Is the main determinant behind the introduction of the use of computers into secondary schools due only to the nature of computers itself, the views & opinions of teachers towards computers, or is it also due to the organisational structure and the decision-making processes of the school ?

3.2 A CASE FOR CASE STUDIES

3.2.1 What is a Case Study ?

A case study is an

"...examination of an instance in action. The study of particular incidents and events, and the selective collection of information on biography, personality, intentions and values, which allows the case study worker to capture and portray those elements of a situation that give it meaning". (Walker, R. 1974, p69).

It is not a specific methodological approach normally linked with a type of observational study (for example, participant observation) but an umbrella term for a family of research methods which have in common the decision to focus on an enquiry around an instance (Adelman, C. et al, 1980). There are, however, common forms of data collection and analyses which one finds being used in case studies, with varying degrees of structure and usage at any one time, depending on the scope and nature of the case being studied. Some of these methods include techniques of observation (participant and non-participant), interviews, note-taking/recordings (audio or visual), and both qualitative and quantitative forms of analyses. The common misnomer is to associate case studies with only qualitative forms of data analyses. In fact, quantitative forms of data analyses could be used instead to gain a better understanding of the case being studied. For example, a quantitative analysis could be done on the examination results of a school in order to obtain a better understanding of the academic goals of the school.

The purpose of case studies is to

"probe deeply and to analyse intensively the multifarious phenomena that constitute the life cycle of the unit with a view to establishing generalisations about the wider population to which that unit belongs". (Cohen, L. and Manion, L. 1980, p99).

Kemmis, S. (1980) believes that it is the case study worker who "makes the case, a case by carrying out the study". The case study worker transforms the situation under study into an object to understand. According to Kemmis, case studies attempt to grasp and speak about the world of human experience, which could be grasped sometimes through commonsense

knowledge and sometimes through the more formal constructions of social science. MacDonald, B. and Walker, R. (1977) and Kemmis, S. (1980) believe that the kind of case studies needed in education are those that call for the fusion of the respective styles of the scientist and the artist. They see the case study as

"like science,...a process of truth seeking. It is not a purely mechanical process by which truth is discovered, ...it is a social and cultural process, ...it is empirical. The truth and falsity of statements made in a case study is judged by reference to a world accessible to the experience of any observer" (Kemmis, S. 1980, p101),

but a case study is also

"the way of the artist who .... through the portrayal of a single instance locked in time and circumstance, he communicates .... truths about the human condition" (MacDonald, B. and Walker, R. 1977, p182).

Whether the case study worker is really able to discover "truths" as MacDonald suggests is questionable. He may however be able to discover different facets or dimensions of ideas that would give a better picture of why things happened as they did or why people felt, acted or reacted in the way they did. The aim of the case study worker is to increase one's understanding and appreciation of the dynamics of a situation.

3.2.2 Types of Case Studies

One way of looking at the "umbrella" of case study approaches is described by Cohen, L. and Manion, L. (1980) in their book "Research Methods in Education". In their chapter on "Case Studies", they elaborate on the fact that the case study approach has different strategies associated with it. The authors identify these strategies as on a continuum of two axes. The first axis is that of the degree of structure imposed by the observer (observational "styles"), and the other axis is that of the degree of structure in the observational "settings". This can be represented in Figure 3.1.

Within the two-dimensional area created by these two axes lies a variety of case studies with a combination of differing observational styles and settings, ranging from the "structured" to the

"unstructured" and from the "artificial" to the "natural", respectively. Although, in theory, there can be any number of combinations in the degree of structure in the styles and settings, one tends to find that a number of factors intrude to make a particular type, or combination of observational styles, more dominant. For example, Cohen and Manion make the point that in a natural setting, it is difficult for the researcher who wishes to be covert not to act as a participant. If the researcher does not participate, there is little to explain his presence, as he is very obvious to the actual participants. Cohen and Manion suggest that most studies in a natural setting are unstructured participant observation studies. On the other hand, they suggest that the opposite is true in an artificial environment where none of the persons being studied are really participants of long standing, and thus may accept a non-participant observer more readily. For example, laboratory settings enable a non-participant observer to use sophisticated equipment such as videotape and tape recordings without being regarded as out-of-place. Thus, most studies in an artificial laboratory setting will be structured and will be non-participant studies.

Taking Cohen and Manion's model of a two-dimensional spectrum of case studies, several examples can be given which could be plotted on their "grid" (as indicated by the first letter of the author's surname, in Figure 3.1). One example would be the case study by Plummer, K. (1975) which was more a life-history study of a paedophile where the subject was intimately known to the researchers in his natural environment. In terms of observational settings, Plummer was in a natural setting and with a very unstructured style where data was gathered in the form of, for example, both solicited and unsolicited letters, interviews, observations, diaries. On the other hand, an example of a case study where the setting is natural but the observational style is very structured is the study done by Sheingold, K. et al (1983) where 3 school systems were examined at 4 different levels - the community, the school system, the individual school, and the classroom. The observational settings were thus the natural setting of the schools but the observational style was structured as the data collected was mainly via interviews, through observing computer use in the schools, and by reading local documents.

Falling in-between these studies, where the observational setting is natural but where the styles used varied from the unstructured to the structured, were the studies by Nash, R. (1973), Ball,

S. J. (1981) and Lacey, C. (1970). Nash, R. (1973) considered himself to be a participant observer where he was observing pupils in their classrooms but also interviewing certain pupils and teachers separately. Some of the teachers would even be interviewed in the university where Nash was based. To achieve a participant observer status, Nash was willing to take classes when teachers were absent or accompany the children on excursions. Case studies by Ball,S. J. (1981) and Lacey, C. (1970) were very similar in that they were also participant observations, but also incorporated the use of questionnaires as well as interviews. Thus, it can be seen that although Nash, Ball and Lacey had very similar natural observational settings, in terms of observational styles, Ball and Lacey would seem to be more structured than Nash. All three, however, were more structured than the study by Plummer, K. (1975) but less structured than the study by Sheingold, K. et al (1983).

Taking the other extreme in artificial observational settings, we find the study by Shields, R.W. (1962) of a boy named Chris, who was in an experimental school for maladjusted boys. Shields spent three months in twice-weekly sessions with the severely disturbed adolescent. Shields left the sessions open leaving it to the boy to decide on what he wanted to do. In this way, the observational style used by Shields was "unstructured" but the observational setting "artificial" as the therapy was held under clinical conditions. On the other hand, the study by Weinreich (1979) was also under clinical conditions but the observational technique used was very "structured" - eliciting personal constructs based on the transcripts of interviews with the boy. Hence, the studies of Shields (S') and Weinreich (W) can be plotted on Cohen and Manion's grid on the "artificial" end of the observational settings but at extreme ends of the observational styles.

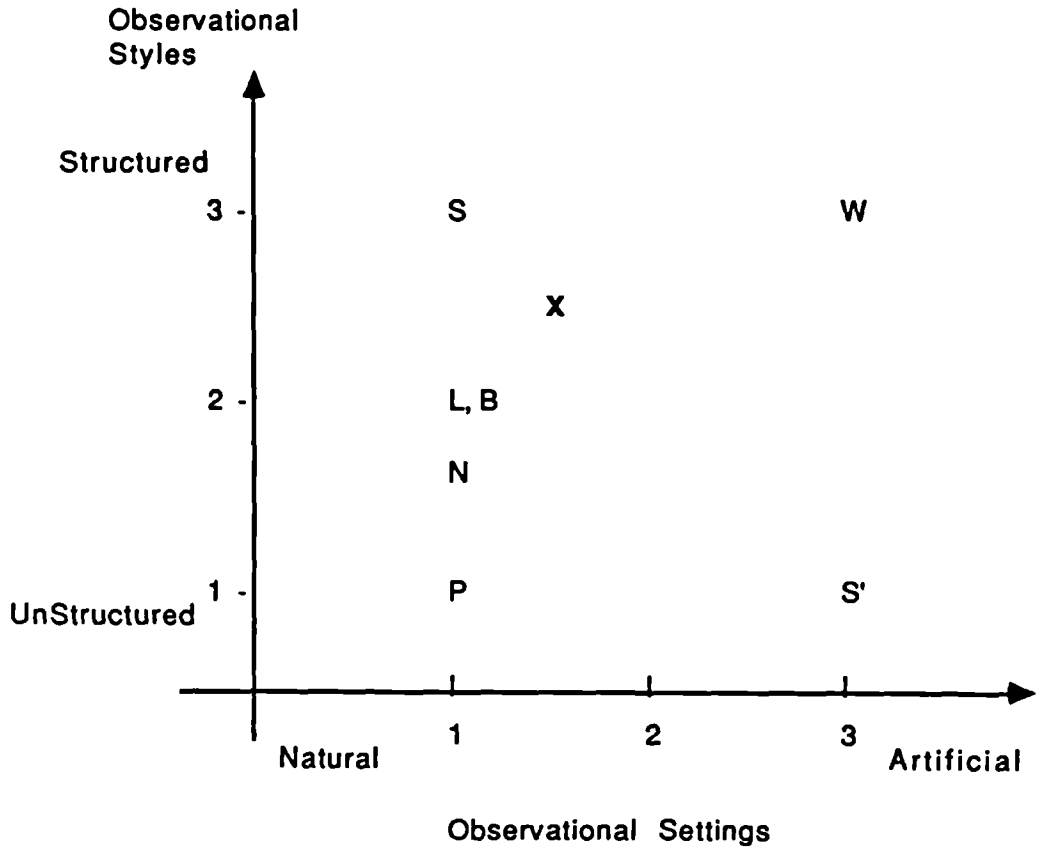


Figure 3.1 Different degrees of structure in observational styles and settings

Following Cohen and Manion's method of classification, this research study can be seen as falling more within the "natural" observational setting. The observational style is semi-structured because the method of acquiring data was mainly through the use of open-ended interviews. This is marked **X** in Cohen and Manion's grid in Figure 3.1. The researcher was seen by the staff in the school as a case study worker and also as a member of staff (which he was at the time of the research). The role taken by the researcher was mixed - as an observer-teacher who was interested in using computers in schools but, at the same time, not taking part in the actual introduction or use of computers in the school. In that sense, as a teacher, the researcher was a participant of the school's activities, but he was not involved in the actual implementation of computers in the school.

3.2.3 Dangers of Case Studies

No research approach is without its problems and dangers. There are some areas of difficulty which case studies are particularly prone to, which include :

1. The researcher in the case study becoming too involved in the issues, events or situations under study, and as a result, losing his perspective and becoming blind to the peculiarities that he is supposed to be investigating.

2. The need to distinguish actual data from the researcher's interpretation of data.

3. The confidentiality of the data. Access to and control of data. What obligations does the researcher have to the organisation being studied, the people in it, his sponsors or his colleagues ? Related to this question is the problem of who does the data ultimately belong to.

4. The audience. Who will be reading the research report ? What will the consequence of the research be ?

These problems cannot be totally avoided, but they can, however, be minimised. Considering each of the issues mentioned above, certain precautions could be taken to combat each of the problems raised :

1. One way to ensure that the researcher does not get so involved as to lose his perspective, is for the researcher to maintain a certain distance from the situation, but not to the extent of alienation. The amount of involvement in the end, however, depends on the kind of information that is gathered.

Cross-checking would be one of the main means of ensuring validity. In social situations, perceptions as to why things occur are multiple and the case study worker seeks to discover the

manifold dimensions of the situation under study. Case studies need to try to represent the various and sometimes conflicting viewpoints of the people and situations observed. The study is validated via a continuous negotiation with those involved. It is necessary to present these differing viewpoints, as only then are we able to begin to capture the multi-faceted nature of these social situations.

2. The status of any data should constantly be made explicit. The reader should be told the different kinds of data used - the overheard should be distinguished from hearsay, primary evidence from secondary, verbatim accounts from summaries, and impressions from facts. At all points, the description of data should be distinguished from the interpretation of the data, even though it might be very difficult to distinguish the "raw" data. For example, any interview transcripts should already be considered interpreted data, as some form of interpretation has already taken place by the transcriber.

3. In the area of confidentiality of data, one way of providing this confidentiality is by the anonymity of the reports. This poses a dilemma however because if the anonymity is such that those in the situation being studied are indistinguishable by the insiders themselves (i.e. those in the situation of the case study), then it is doubtful whether those concerned would be able to learn from the situation that was being studied. On the other hand, if the anonymity works only for outsiders, then those with the most to gain or lose become vulnerable. As the rights of an individual are at stake, this becomes an ethical problem. The SAFARI team, for example, faced similar questions and the stance that they took was that informants had the right to "edit" the researchers' accounts of their views and actions. This was reflected in the method of evaluation chosen by them and known as "democratic evaluation" (MacDonald, B. and Walker, R. 1977). According to MacDonald and Walker, democratic evaluation is

"....an information service to the community about the characteristics of an educational programme. It recognises value pluralism and seeks to represent a range of interests in its issue formulation. The basic value is an informed citizenry, and the evaluator acts as broker in exchanges of information between differing groups.... He offers confidentiality to informants and gives control over his use of information.... The evaluator engages in periodic negotiation of his relationships with sponsors and programme participants."

This means that the researcher will however have to face the fact that some of his finest data may be lost forever.

This raises another issue where, for example, in television documentaries of sensitive institutions where the break of confidentiality might be against the wishes of the participants of the study but might be considered important for the public to know, can exceptions be made ? The researcher must thus make his own value judgement and decide whether to promise confidentiality of data in the first place, weighing his responsibilities to the people involved in the case being studied and his responsibilites to the public. As suggested by Adelman, C. et al (1980), it may be that the limiting consideration the case study worker must bear in mind when deciding on this issue of confidentiality of data, is the knowledge that others (both insiders and outsiders) must live with the consequences of his findings.

4. The audience of the research report will depend on the purpose of the case study. It is felt by Simons, H. (1980, p5) Sage, M. and Smith, D.J. (1983, para5.4), and MacDonald, B. and Walker, R. (1977) that the research study should be reported in language which is accessible to their audiences, and that the language and form of presentation used should not be filled with "jargon" or terminology which is less accessible to the reader. As commented by Macdonald, B. and Walker, R. (1977, p186),

"His [the case study worker's] techniques of.... presentation must be accessible to non-specialist audiences. His main activity is the collection of definitions of, and reactions to, the programme.... The criterion of success is the range of audiences served. The report aspires to 'best-seller' status".

Simons, H. (1977) argues that the audience should be the ones who make the final conclusions. She feels that case studies should be inconclusive accounts of what has happened, leaving the reader with all the information and accounts readily available for the reader to make a final decision.

Finally, decisions as to how case studies are planned, conducted and reported are as much to do with practical considerations as theoretical - governed by the exigencies of the situation, as well as by general views of educational research and evaluation.

3.2.4 Why a Case Study ?

Embedded in this question is the need to ask whether the study of a particular case could be generalised or applied to other cases and situations. This is one of the main ways whereby a case study can be justified as useful. Stake, R. E. (1980) and Kemmis, S. (1980) believe that the case study should be grounded in experience, i.e. in a "naturalistic" way, utilising the tacit knowledge that people already have about how things are, why they are, how people feel about them, and how these things are in other places. In this way, a form of generalisation takes place and the case study provides a platform whereby it communicates in ways that build on current knowledge and by the description of specific incidents and events which are recognizable. Generalisation thus takes place when, on the basis of what is observed concretely in a particular case (for example, in a school), the researcher works backwards to form more general categories of the types of social interactions, decision-makings, curriculum patterns etc. of the school.

Considered as products, case studies may form an archive of descriptive material sufficiently rich to admit subsequent re-interpretation within the limitations imposed by the conditions of the study. Like life-history studies, case studies can be used in the exploration and in the generation of theories (Faraday, A. and Plummer, K., 1979). Case studies can be used as a base to 'throw-up' theories around a particular area. Through the inspection of similar case studies, a theoretical theme can be extracted and examined. Case studies, however, may reveal more questions than answers as they seek out solutions. At their best, case studies are used in an exploratory fashion for generating many concepts and ideas, both at the local and situational level and on the historical structural level, within the same field and in relationship with other fields. The strength of case studies lies in their attention to the subtlety and the complexity of the case in its own right. They are a step to action. They begin in a world of action and contribute to it. They draw attention to the discrepancies or conflicts between viewpoints. The case study unfolds rather than narrows. One is left with more to pay attention to rather than less.

3.3 THE STUDY

This research study was based on a medium size comprehensive school in England, which we shall call Barnaby Comprehensive. At the time the research was conducted, there were 1,300 students on roll, with over 160 pupils in the 6th form. Pupils in the lower school worked in mixed-ability classes for History, Geography and the Arts, but for Mathematics, English, Science and Modern Languages, they worked in groups according to their ability. Banding was more distinct when it came to the options work in the upper school. A more detailed description of Barnaby Comprehensive is provided in Chapter 4.

There were two main reasons why Barnaby Comprehensive was chosen as the school to be studied. Firstly there existed a unique opportunity due to the fact that the school had recently purchased seventeen BBC Computers. Funds were obtained through various sources including organised fund-raising events and through the Parents Association. Twelve of the computers were for the newly formed Computer Studies Department, with the other five computers being purchased for the five major departments in the school (i.e. Science, Mathematics, Geography, History and Business Studies Departments). Within these departments, they were intended to be used specifically for Computer Assisted Learning (CAL) applications. The researcher's main interest was in the use of the computers in these departments.

Secondly, the researcher was employed by the school as a part-time teacher at the time the research was about to begin. Although the part-time "job" was for only three hours per week (in the first two years) and an hour a week (in the third year), the researcher spent an average of two days a week in the school carrying out the research study, with more days spent per week during the stages when the interviews with different members of staff were carried out. Being a part-time teacher in the school proved to be tremendously helpful because the teachers saw the researcher as being "one of them" and not as an outsider intruding into the business of the school. Backing was provided by the Headteacher and some of the members of staff for they too were keen to see how teachers would use or not use the computers being purchased. This

was attested by the fact that it was not a problem to arrange interviews with members of staff, except for one head of department (whom other members of staff also found difficulty in arranging meetings with). Most of the members of staff were willing to be interviewed even in the very same week that they had been approached. The problem of objectivity is recognised as the researcher's mere presence can be seen as an "interference", but this problem is acknowledged in social-science research. To what extent the researcher should participate in the computer activities happening in the school was a more critical question. The role decided on in the end, as earlier mentioned, was that the researcher would merely be an observer-teacher who was interested in the use of computers in schools.

The researcher was also aware that, at the beginning of the research study (summer of 1982), the school, in comparison with other schools, was unusually well off in the number of computers it possessed. The problem facing most schools at that time was that there were an insufficient number of computers in schools, and in some cases, one computer had to be shared by the entire school. However, it was felt that this was only an initial problem which, although necessary to bear in mind, should not prevent research being done which would look to the time when more computers were available in schools.

3.3.1 The Research Stages and Data Collection Instruments Used

The main study was conducted in three major stages over the period of the summer of '82 to the summer of '84. The chief form of data collection adopted was via semi-structured interviews, although questionnaires were used when more straight-forward information was required. The semi-structured interview was chosen, as it gave more flexibility in ascertaining views and opinions, and in probing into specific areas when it was felt necessary. The interviews were generally conducted in an empty office in the school and normally lasted about 45 minutes during school hours, although there were some interviews that had to be conducted outside school hours as teachers were very busy during the school day. All of the interviewees were asked if the interview could be tape-recorded, and permission was given by all except the

Headteacher. Confidentiality of data was assured before each interview with the assurance that all names eventually used would be fictitious.

The first major stage of the research (June '82 to October '82) was to observe the operation of the school. This consisted of a series of interviews with some of the staff in the school including the Headteacher and the heads of seven departments. It meant looking at the way departments generally decide on the syllabus to be used, the assignment of teachers and the purchase of resources for example. This also meant finding out how policies were discussed, made and carried out within the school and departments, who made most of the decisions, and the roles and range of practices of teachers within the departments (see Appendix A for the interview questions used). These interviews were recorded and detailed notes made from the recordings. Part of the first stage of the research consisted of finding out the considerations of the Headteacher and the heads of departments before any curriculum development was carried out, and the way they would introduce it to the school. Special attention was paid to their considerations and strategies for implementing the use of computers in the school and within their departments. A short history of the arrival of computers into the school was also written up at this stage based on interviews with the Head of Physics and the Headteacher (see Appendix B for the interview questions). This stage coincided with the time when the BBC computers actually arrived into the school, although there were already two PET computers (plus a couple of Sinclair computers) being used, mainly by the school's Computer Club.

The second major stage of the research (November '82 to April '83) was to elicit, again via semi-structured interviews, teachers' views and opinions about computers in general and the use of computers in teaching. This second stage started off with an initial plan of interviewing all of the teachers chosen regarding their views on various teaching methods and resources, together with their views about using computers in their teaching. After the first two interviews, it was realised that the data collected was very lengthy and difficult to analyse because of the open-ended nature of the enquiry. It was then decided to start off with a short questionnaire, allowing data to be collected and analysed more systematically. This questionnaire was designed to find out the views and opinions of teachers on various teaching methods and resources (Appendix

C). One of the points of interest in the research was to see whether the views and opinions that were expressed by the teachers with regards to their use or non-use of teaching methods and resources, would be predictive of their eventual use of computers in teaching. If it could be roughly predicted, then it would be useful to isolate the factors that enabled such a prediction to be made. This was then followed-up by another questionnaire (Appendix D) to obtain the biographic details of the interviewees (for example, qualifications, number of years of teaching), and hence provide a context and background to the study of the teachers who were being interviewed.

The major part of this stage, and of the research study, was the series of interviews with the teachers in the five departments of the school (see Appendix E for the interview questions). Initial pilot work was carried out with a teacher in another school to see whether the questions planned for these interviews were appropriate. The aim of these main series of interviews was to assess the attitudes that teachers had toward computers in general and the use of computers in teaching, and teachers were urged to develop their ideas on each of these areas. In the assessment of teachers' views and opinions, focus was put on understanding the factors that influenced the use or non-use of computers by the teachers. Another purpose of the interviews was to find out the organisational problems that teachers perceived they encountered or would encounter when attempting to use computers in their teaching, and who, they thought, should or would be able to solve some of these problems. In addition, teachers were also asked about their reactions to the leadership styles and strategies of their heads of departments (and Headteacher) in implementing the use of computers in their department (and in the school).

The other part of this second stage was to find out, again by another series of interviews, the strategies, if any, that the heads of the five departments had with regards to the purchase and the method of introduction to the use of computers in their departments. This was extended to the Headteacher of the school to see the strategy that he employed in the implementation of computers into the entire school (see Appendix F for the interview questions for both the heads of departments and the Headteacher). At a later stage, it was important to see whether

these strategies were practical and effective within the different departments concerned as well as the school. Both series of interviews at this stage were recorded and transcribed and a sample of two teachers from these interviews are enclosed in Appendix I.

The third major stage of the research study was held in the summer of '84. This consisted of another series of interviews with the teachers and heads of departments in the five departments of the school, including the Headteacher (Appendix G for interview questions). The aim of this series of interviews was to record any change of attitudes that teachers may have had about computers in general and the use of computers in teaching, the perceptions that they had concerning the organisational problems or solutions encountered in the use of computers, and whether there were any changes in their actual use of computers, after a period of one and a half years. In addition, teachers were also asked about any changes they might have in their reactions towards the strategies and leadership styles of their heads of departments in introducing the use of computers.

Another series of interviews was also conducted with the heads of departments (and the Headteacher) to record the perceptions that these decision-makers had concerning the progress, or lack of progress, of their strategies, and of the actual uptake of computers in teaching, in their departments and in the school, one and a half years later (see Appendix H for interview questions). Again, both series of interviews at this stage were recorded and detailed notes made.

Throughout the research study, the researcher was working as a part-time teacher and so was able to monitor any new computer activities that were taking place in the five departments and in the school, to see whether there was any indication of changes of teachers' attitudes and opinions about computers, to see any actual use of computers being made, to follow-up any queries or conversations, and generally to obtain an impression of these departments and to observe how the school was run.

3.3.2 The Sample

The sample was determined by those departments that had decided to purchase a computer for use within their department. The assumption was that the teachers in these departments would have a greater chance to use computers. The five departments spanned some of the major curriculum divisions of the school and consisted of the Science (which included Physics, Biology and Chemistry), History, Mathematics, Geography and Business Studies Departments. It was important to see whether the different subject disciplines (for example, the Sciences, the Mathematics and the Humanities) and the teachers within these departments would perceive computers, and the use of computers in teaching, in different ways.

Although the choice of departments was largely determined by external circumstances, the selection of teachers was done so as to provide a range of teaching experience in the sample and including the decision-maker of the department, taken to be the head of department. The assumption made was that teachers with varying years of teaching experience would have, if any, different experiences of computers and the use of computers in teaching. Thus, for each department, teachers were selected to cover the policy-maker of the department, an "experienced" teacher and a "non-experienced" teacher, as defined by years of teaching experience. On average, three or four teachers were selected from each department (depending on the size of the department). The only exception was the Business Studies department where there were only three teachers of different subject disciplines (Economics, Sociology and Commerce) and so only the head of department, who was also the Economics teacher, was selected, as he was the teacher most willing to be interviewed. Also, it was unfortunate that the head of Mathematics was busy most of the time and so felt unable to give the time needed by the researcher to carry out the interviews with him. He was, however, willing to fill in a questionnaire that briefly covered the same areas intended to be covered by the interviews (but unable to cover it to the same depth). The head of Mathematics was thus excluded from the main sample of teachers but any relevant comments made by him (via the questionnaire) were incorporated in the relevant sections of the analysis of the reseach study. The choice of sex in the sample was purely by default and had no part to play in the selection

procedure. In the end, 15 teachers including heads of departments, were chosen for the sample (Figure 3.2). Three of these teachers had left the school after the first year of the research study.

s/no.	Name	Subject	Number of Years of Teaching	Remarks
SCIENCE DEPARTMENT				
1.	Mr. Cano	Chemistry	19	Head of Department
2.	Mrs. June	Biology	3	
3.	Mr. Mikado	Physics	14	
4.	Mr. Bohr	Physics	4	Head of Department
HISTORY DEPARTMENT				
5.	Mr. Johnson	History	11	Head of Department
6.	Mr. Joachim	History	3	
7.	Mr. Ridley	History	4	Left in summer '83.
8.	Mrs. Malory	History	16	
GEOGRAPHY DEPARTMENT				
9.	Mr. Coleridge	Geography	18	Head of Department
10.	Miss Constance	Geography	3	Left in summer '83.
11.	Mr. Hugo	Geography	34	
MATHEMATICS DEPARTMENT				
12.	Mr. Joule	Maths	5	
13.	Mrs. Jackson	Maths	8	Left in summer '83.
14.	Miss Sully	Maths	3	
BUSINESS STUDIES DEPARTMENT				
15.	Mr. Rubens	Economics	8	Head of Department

Figure 3.2 Teachers chosen in the Research Study

3.3.3 The Analysis

In the interviews with the teachers, a distinction was made between how they saw computers in a very general way, for example, in society or industry, and how they saw computers in school and in their teaching. A sample of two interview transcripts are enclosed as Appendix I. Some of them, of their own free will, began to talk about how they saw themselves (i.e. their self-concept) and also how they saw themselves in relation to using computers. A few also talked about how

they viewed their teaching as they felt it important to mention this in the context of their views and opinions regarding the use of computers in school. These interviews were mainly analysed at three levels - at the level of the teacher, the department and the school.

To analyse these interviews more coherently at the level of the individual teacher, a series of categories were chosen. These categories arose partly from theory and partly from the data, although not all of the categories were relevant to all of the teachers. Thus, teacher profiles were drawn up to summarise what they had said under each of these seven categories :

- Biographic Data.
- Initial Contact With and Attitude Towards Computers.
- Self-Concept.
- Attitude towards Teaching in General.
- Attitude towards Computers in General.
- Self-Concept Related to Computers.
- Attitude towards Computers in Teaching.

This then gave rise to another level of seven categories (plus a category for those teachers who did not mention anything at all) to describe these teachers. The categories were defined as follows :

- The Favourable (+) category included all teachers who said they were impressed and enthusiastic about computers.
- The Critical (+C) category included all teachers who said they were positive about computers but had several critical comments about the way they should be used or about the hardware and software associated with computers.
- The Worried (+W) category included all teachers who said they were positive about computers but had several worries or fears about their use in and implications for society, themselves and their teaching situation.

- The Unfavourable (-) category had to do with perceptions held by teachers about computers that were negative.
- The Antagonistic (-A) category described teachers who said they felt insecure, very afraid or against computers.
- The Indifferent (o) category described teachers who said they were non-committal about computers.
- The Uninitiated (?) category was for teachers who did not have any real perception or idea about the use of computers in school and teaching.
- The Not-Mentioned (NM) category was for those teachers who did not mention any opinions at all about computers.

It was recognised that the views and opinions held by teachers about computers were not just black or white, but revealed an extremely broad spectrum of attitudes even within just five departments of a school.

The teachers' interviews were also analysed at the level of the department as "Department Profiles". Each "Department Profile" included simple factual descriptions based on the interviews with teachers, and impressionistic accounts of the department based on conversations and observations made in the school. The categories drawn up for the department profiles included :

- An Overall View. A factual statement about the number and nature of staff and pupils in the department.
- Teaching Practice and Support. A description of the administration and the teaching methods and resources used by the teachers in the department.
- Impressions. A personal view of the working relationships within the department, based on observations made and conversations heard.
- Teachers' Organisational Profiles. The teachers' views and opinions towards the use of computers in the context of the department.

- Strategies & Politics. An analysis of the head of department's strategy, and the reactions of the staff towards his strategy in introducing the use of computers in the department.

It was felt at this point that a more useful model was needed to help out with the analysis. Lundgren's Frame Factor Theory, described in greater detail in the previous chapter, was of interest, as it provided a framework which indicated the different kinds of factors (or frames) that might be involved in any form of curriculum innovation. Lundgren viewed the teaching process as context bound. It was seen as being determined by rules that regulate (for example, the strategies of the decision-makers), frames that form a boundary (i.e. the organisational constraints and solutions) and goals that govern (i.e. the curriculum) the teaching process. A fourth system, the attitude system, was added to reflect the views and opinions of the teachers towards audio-visual aids and computers (in general, in teaching, and in administration).

A comparison of the strategies and leadership styles of the heads of departments was based on the set of categories formulated by White and Lippitt (1968) on leader behaviour and member reaction. In this research study, the leadership styles were categorised under the three headings of autocratic, democratic and laissez-faire (which was elaborated in Chapter 2). Teachers' perceptions of the use of computers at the different levels of department and school were then represented as driving or opposing forces using Lewin's (1952) Force Field representations. Lewin's force field representations made it possible to show, dynamically, the magnitude and direction of these factors of change.

This analysis was then extended to the level of the school. It looked at the perceptions teachers had towards the organisational constraints and solutions at the school level, the strategy of the Headteacher, and the reactions of the teachers toward the strategy and policy of the Headteacher. Some teachers also made mention of outside influences which they perceived would affect the use of computers in the school. Although the research did not set out to thoroughly cover these issues, they were however included if they were mentioned by the teachers themselves.

The analysis ends with a very brief picture of the actual use, or non-use, of computers by these teachers, and of the progress, or lack of progress, made by the heads of departments in the implementation of computers in their departments, one and a half years later. A general description of the "state-of-play" regarding the use of computers within each department was provided with a description of how teachers perceived the "success" of the initial introduction of computers. The analysis then concludes with a discussion about the possible factors, or combination of factors, that might have been critical in encouraging or hindering the use of computers in the departments and school.

3.4 LIMITATIONS OF THE RESEARCH STUDY

In any research work there are always certain limitations, either external or internal. This is due to the fact that, internally, one has finite energies and time, and externally, the case being studied was only at a particular stage in time. One particular limitation was the fact that the time-scale of the main portion of the research study was only for a period of two years. This meant that the research done was only an annotation of the beginning of an unknown length of computer innovation in the school. After two years, things might have only been beginning to happen and that only in certain areas and with certain individual teachers.

Another limitation of this study was that the depth of observation was only from the level of the school to the teacher. The research study did not, for example, look at the pupils themselves - their views about computers and using computers in their lessons. This is not to say that it is not important to analyse these views and opinions of the pupils. On the contrary, it is important to pursue the research to the point of where and how the computers are in operation in different classrooms, and the pupils' reactions and interactions with them. This itself, however, is worth several other major research studies.

It is however noted that even with these limitations, the lessons learnt and further questions raised through this research study would be beneficial to our overall understanding of schools and of computer innovation in schools.

CHAPTER 4 : BACKGROUND

4.0 INTRODUCTION

In order to understand how an innovation is adopted in a school, it is necessary to appreciate how a school behaves and to see how it is run. Any innovation needs to be seen in the context of the history of the school and the political and social interactions within the school. This chapter thus provides a background to the research in that it starts with a brief description of the school where the case-study was conducted (Section 4.1) and follows up with a short history of the arrival of computers into the school (Section 4.2).

The description of the general running of the school was achieved by carrying out a series of interviews with several of the staff in the school. These included interviews with the Headteacher and the Heads of History, Science, Geography, Physics, CDT (Craft, Design and Technology), the Individual Teaching Unit and Home Economics. These departments were chosen because, at the time of writing, there were computer-based materials available in these subjects and hence if these departments decided to use CAL, there would be a minimum amount of available software. An understanding of the decision-making process of the school in the area of school finance was obtained by attending the Heads of Department's Finance Meeting (for 1982/83) where the deparments' capitation for the coming year is debated and finalised, and by interviews with the Headteacher. What is written is only a summary of how the Headteacher and the heads of departments perceived "policy-making" to be carried out in the school and departments.

To provide the context wherein these decision-making processes take place, the questions asked by the researcher in the interviews (Appendix A) were aimed mainly at finding out the perceived roles of the Headteacher and the Heads of Department, how policies were discussed, made and carried out within the school and departments, the school's and departments' assessment criteria in allowing a new teaching method, aid, or curriculum to be introduced, and the way in which a teacher is assisted in his or her teaching. This is reported as

Appendix J. What is written is the researcher's perception and resumé of how the various heads saw their role. It is a generalisation of their roles, and not a detailed analysis of the different perceptions that various heads had of themselves or of each other.

The short history of the arrival of computers in the school was obtained mainly through interviews with the Headteacher and with Mr. Bohr, the Head of Physics and chief initiator in the purchase and use of computers in the school. The questions asked (Appendix B) were aimed at finding out the chronological account of the different purchases and use of computers in the school, and the influences (both internal and external) that contributed towards the purchase and use of computers in the school. This is covered in Section 4.2.

As was mentioned in the previous chapter, all case-study work is tainted with the experience and involvement of the case-study worker. A short biography of the case-study worker, concentrating on his relevant past education and training is thus provided as Appendix K.

4.1 BARNABY COMPREHENSIVE

4.1.1 Introduction

The school is a co-educational Church of England Aided Comprehensive School. It was a secondary-modern school which became comprehensive five years ago. At the time of research, the school provided education for children between the ages of 12-18 years old (starting at the 2nd year) from the surrounding district. The school had a nine form entry with about 270 students in each year. There were approximately 1,300 students on roll, with over 160 in the 6th form. Being a Church of England school, a number of the entry places (not to exceed 120 places) were reserved on denominational grounds.

4.1.2 Location and Architecture

Barnaby Comprehensive is situated on the north-west side of a fairly populated town in the south of England in the "Commuter Belt" of the Capital. There is very good road and rail access to different parts of the country. At the time the research was conducted, there were seven secondary schools and forty primary schools which served an area with a population of approximately 50,000.

The school stands in an attractive, residential Council estate. It is twenty acres in size with good games and building facilities. There are two playing fields in the school together with twelve tennis courts which double-up for netball courts. It is a fairly modern school built in the late 60s. The school itself consists of 5 main buildings with several "huts" concentrated around the main buildings.

The main catchment area of the school at the time the research was conducted consisted of two main towns. 65% of the pupil population came from the town in which the school was situated, 20% from the adjacent town, and 15% from the surrounding villages. Pupils were "bussed" from the other towns and villages. Although the catchment area was situated in a fairly middle-class region of England, 30% of its pupils came from Council homes.

4.1.3 Composition

The composition of pupils in the school consists of a mixture of both middle and working class. At the time of the research, 60% of the pupil population were from middle class homes, while the other 40% were from working class homes.* The school consisted of predominantly white pupils (97%) with only a small fraction being Asian (1%), West Indian (1%) or others (1%). Also at the time of the research, about 40% of the pupils were able to complete their CSEs in five or more subjects, approximately 50% of those taking "O" levels completed them successfully passing three or more subjects, and about 20% passed their "A" levels in two or more subjects. The average drop-out rate of the school was about 6.8% due mainly to parent mobility.

* These figures are approximate.

At the time the research was conducted, there were eighty-seven teaching staff and eight non-teaching staff in the school. Of the eighty-seven teaching staff, six held very senior positions (for example, the Headteacher and Deputy Heads), sixty-four were full-time teachers and seventeen were part-time teachers. Of the seventy senior and full-time teachers, thirty were Scale 1s, fourteen were Scale 2s, sixteen were Scale 3s and ten were Scale 4s and above, giving us an indication that over half of the teaching staff were experienced teachers and that a number of them held senior positions in the school.

The age range of the staff was quite evenly spread out with about thirty teaching members of staff under thirty-five years of age, about thirty-five teachers between thirty-six and fifty years old, and about twenty teachers over fifty years of age. About two-thirds of the staff had received University training while the other third received other forms of related training in teaching (for example, Certificate in Education) with a number of years of experience. The turnover rate (i.e. the number of teachers leaving the school each year) at that time was about 10%. Teachers left for varied reasons including that of promotion prospects, retirement, change of vocation and family.

4.1.4 Curriculum

Pupils were given a wide general education in the first two years of school life in Barnaby Comprehensive. This included a curriculum of English, Mathematics, Science (Physics, Chemistry, Biology and General Science), Languages, History, Geography, Religious Education (RE), Physical Education (PE) and Creative Arts (Music, Drama, Home Economics, Art, Ceramics, Textiles and CDT). In the Art and Design Department, for example, design, print-making, pottery, sculpture, 3-D studies and art history and appreciation were covered in addition to the normal painting and drawing. In the Home Economics and Textiles Department, nutrition and cookery were covered along with fashion and embroidery. A broad approach was taken in music where there were class lessons in basic music theory as well as involvement in music-

related extra curricular activities, such as the school choir and orchestra with a musical evening organised once a year.

In their 4th and 5th years, whilst all pupils continued studying English, Mathematics and RE, they had to opt for specific subjects to prepare for either their GCE "O" Level or CSE examinations, and eventually GCE "A" Levels. Some of these options were peculiar to Barnaby Comprehensive as it tried to provide a wider range of options for its pupils. For example, the school offered the opportunity of studying an additional foreign language like German, Spanish or Latin up to "O" or even "A" levels. The school was also twinned with schools in Germany and France, and annual exchange visits were arranged. In the History Department, two examination courses (the British Social and Economic History, and the Schools Council History 13-16 Project) were offered. Economics, Business Studies and Sociology were also offered to both CSE, "O" and "A" levels. A General Studies course was organised to complement full examination courses. This ensured that those who had specific difficulties in learning academic subjects would have an opportunity to be exposed to the other subjects at a "general knowledge" level.

Pupils worked in some mixed ability classes and in certain subjects including Mathematics, English, Science and Modern Languages, they worked in sets according to ability, i.e. "banding" was practised in certain subjects and heads of departments had the freedom to place them in particular groups as they wished. Special arrangements were made for pupils with specific learning difficulties in the Individual Teaching Unit (ITU). They were taught in very small groups or even individually for the whole year. Others might have to report to the unit for a short period of time to sort out some particular learning difficulty which was holding them back in the classroom.

There were over one hundred and sixty students in the Sixth Form, some of whom followed the two-year "A" level courses in a variety of arts, science and practical subjects, while others followed a one-year Foundation course at various examination levels. All "A" level students did a

General Studies course covering Sociology, Politics, Science and Technology and Arts (which covered general cultural and aesthetic aspects of the curriculum).

There were nearly forty different clubs in the school, conducted during lunch breaks and after school. These encompased all the major sports as well as other activities including Christian Union, Chess, Duke of Edinburgh's Award Scheme, Ski-racing, Printing and Drama. Inter-house activites were also organised which included sports competitions, general knowledge and drama competitions.

4.1.5 Staff Communication

There were both formal and informal methods of communication within the school. Most communication between staff however was done informally and was constantly done during breaktimes, lunchtimes or before and after school hours. Most matters regarding problems with pupils, activities within the school, teaching etc. would be settled within those times.

There were also formal channels of communication within the school. These, in the main, were timetabled so that specific periods were set apart for various groups of staff members for discussion, training, decision on policy matters etc. This formal communication network included :

1. A staff meeting every Monday morning for the first half hour of the day to discuss, inform or highlight any school events or issues for the coming week.

2. An In-Service Training (INSET) session every Tuesday after school from 2.30pm onwards (i.e. the school ended one hour earlier that day). These sessions were split into a cycle of three sessions, with one session each being used for -

(a). Staff members to meet in their departments mainly for general administration, coordination of matters within the department, training, or for decision-making (for

example, deciding certain policies of subject syllabus or curriculum that would affect the pupils in the department).

(b). Tutors and heads to meet in their respective houses to discuss any pastoral needs of their pupils or any activities being organised within the houses.

(c). Department Heads, Heads of Houses and Senior Teachers to meet and discuss policy issues. About once a term, this session was an open session used for staff development.

3. A meeting between senior teachers (Scale 4 and above) every morning at 8.30am for half an hour with the Headteacher. This was to discuss any immediate issues for the day so as to ensure the smooth daily running of the school.

4. The meeting of different working groups or committees within the school. These groups were set up for specific durations to formulate recommendations for certain policies or implementations within the school, or to organise certain activities/events in the school. They consisted of small numbers of teachers specially selected, who had relevant abilities or interests in the field or activity being looked at. Some of the working groups meeting at that time included a group which looked at the school's 6th form teaching and were formulating ways of improving it and another group which looked at how the video facilities in the school could be updated.

Besides these meetings, there were also written forms of communication in the school. These consisted of newsheets which were being produced every week (one type for the staff and another for the students). These newsheets generally provided the programme for the coming week's activities plus any important and relevant notices. Advance notice was also given of important events that were about to take place. There was also a newsletter produced for parents twice every term which kept parents informed (but only very briefly) of the main activities or events happening in the school. With regards to the amount of paper generated, a number of

the staff members did make the comment that the use of paper for notices was "an obsession" in the school.

There was also the main staff meeting held at the end of the academic year, just before the summer vacation. This was to say farewell to those staff members who were leaving the school and also to welcome new staff members into the school. One of the main items of the meeting was the provision of the "school pack" given to all members of staff (for the coming academic year). This pack consisted of all the essential information needed for the individual teacher to prepare for the coming academic year and included a complete staff list, the overall staff timetable for the coming academic year, the school's diary of events for the coming year, the school's pupil list, which gave details of the pupils that would be in the various years, houses and tutorial groups, the school's handbook which provided general information about the school with the subjects offered by the school, the various formal slips of paper used by the school, for example, for assigning pupils for detention, pupils reports, staff cover etc., and finally, a layout of the school showing the different room allocations (which proved to be especially useful for new staff members).

At the level of the department, communication within departments happened independently with other departments. There was seldom any formal contacts between departments with regard to subject syllabus or teaching methods. Those departments that had other "departments" within their department (for example, the Science Department included the Chemistry, Physics and Biology Departments within its portfolio) were more dependent on one another.

4.1.6 Finance

The school is a Church of England school aided by the State. This meant that the local education authority (LEA) paid the salaries of the members of staff of the school (teachers, administrative staff, cleaners), the maintenance of the internal structure of the school, and the capitation of the school which included the costs for books, educational materials and

equipment. In 1982 alone, Barnaby Comprehensive received £40,000 from the State for the servicing of the school. The Church was then responsible for the external maintenance of the school. However, the State (through the DES) would normally subsidize 85% of any repairs done to the external fabric of the school. The school was thus concerned with the other 15% and this was obtained via the letting of the school buildings to other societies and organisations in the evenings and weekends. Any additional profit was channelled into the school fund which was then used to supplement any other financial needs in the school.

Since the school is a Diocesan school, the Diocese would help out if the school could not afford to pay its bills. This was achieved through loans and gifts from the Church. The Church however would prefer the school to be self-sufficient and autonomous. Other sources of finance would thus have to be obtained via fund-raising activities including sponsored walks, fairs etc., with substantial help from the Parents Association. In 1982 for example, about £8,000 was raised from such activities. £4,000 was made available to the school (for special allocations decided by the finance committee), and the other £4,000 was given to charity.

The expenditure of the school was normally divided into four categories of 'Basic Expenditure' (i.e. normal running cost of a department/course), 'Special Allocations' (i.e. one-off expenditure, for example, curtains), 'New Courses' (for example, Computer Studies to be introduced), and 'Books/Library' (which was given a special category as this was a specific school goal to provide sufficient school textbooks for all of its pupils). If any new educational resource or curriculum development was introduced, this was done at the expense of something else, i.e. other resources may have had to be forfeited.

All requests for expenditure were then submitted to the heads of departments' finance meeting (an example of the departments' recommended financial allocations is provided in Appendix L). This was normally held in June each year. Before an allocation was finalised, the following procedure had to be followed :

1. Before the finance meeting, each head of department had to submit their projected expenditure claims (in the order of urgent needs, preferable needs, and book purchases as this was a school goal).

2. The Headteacher then made a decision as to whether the claims were reasonable. If they were, he would then put the claims forward to the senior teachers and heads of departments in the finance meeting.

3. At this meeting, the heads of department were able to get a fair idea of the overall needs of the school and its priorities, before justifying their claims. Whether a claim was passed or not was decided by common consent from all present at the meeting.

4.1.7 Policy-Making

Within a school, the two main factors that affect the introduction, implementation and development of a curriculum innovation are educational and financial considerations. These two factors inter-relate and are largely determined by policy makers of the school who were generally the senior teachers in Barnaby Comprehensive. Some of the curriculum development that had taken place in Barnaby Comprehensive within the past few years had included the "Geography for Young School Leavers" Project; the "New History" Project; Craft, Design and Technology; Music; City and Guilds; and more recently, Computer Studies.

The heads of departments perceived themselves as playing a key role in any new innovation within the school. They saw themselves as the innovators for any curriculum development both within their department and within the school. The Headteacher perceived himself as taking a supportive role in any innovation but would sometimes step in and initiate, or would call in an appropriate member of staff to initiate an innovation within the school.

4.1.7.1 At the School Level

For a curriculum development that would affect several departments in Barnaby Comprehensive, the usual procedure for initiating an innovation would be :

1. For the initiator to provide a paper in support of the innovation after a time of investigation, say for a period of a term.

2. The Headteacher would then invite interested heads of departments and senior staff to consider the findings. He would try to ascertain the interest generated and to see whether there would be adequate support.

3. If there was sufficient response, they would then formulate a general strategy for the initial implementation (including allocation of rooms, equipment, staffing).

4. This initial strategy would then be studied in greater detail within the departments. Each department would then present a report of how it could be implemented within their department.

5. If the interest and support was sustained, then a formal request would be forwarded to the finance committee (which comprised all heads of departments, senior staff, the bursar and Headteacher).

6. A standing committee would then be set up and would consist of three members of staff, including the initiator. they would then look into the actual cost of implementing the innovation.

7. A final decision would then be made by the common agreement of the finance committee and appropriate action taken, including making orders for materials, equipment etc.

The actual implementation of the innovation into the curriculum would then involve the necessary appointment and training of teachers, the allocation of rooms, the decision on the quota of pupil intake, and the final costings. In the case of Computer Studies, this initial process of implementation took about two years to complete. As far as possible, the Headteacher was not involved with the actual implementation of the innovation at the level of the department.

Evaluation was seen to be important in the innovation. Sometimes, the Headteacher would request a report from the heads of departments or initiator as to the progress of the innovation, or he would personally conduct a quick "inspection" of the work done so far. The Headteacher felt that if there was an on-going "inspection" scheme throughout the school, then the teachers would not feel threatened when he did "inspect" them. Often, he noted, that teachers themselves would seek advice from their colleagues in other schools with whom they may have contact, or teachers might request the advise of their subject inspectors on any curriculum development within the department.

4.1.7.2 At the Department Level

If the cost involved in implementing a curriculum development was within the budget of a specific department, then the policy-making procedure was done entirely within the department and the Headteacher was only informed of the decision.

It was normally the heads of departments who made the initial decision as to whether they should put forward any new ideas to the entire staff within their departments. They felt that corporate decisions were required because whether or not new innovations were finally accepted and implemented hinged on whether the staff were prepared to carry them out and how they saw their role in the implementations.

For those departments that were within a bigger department, prior consultation would first have to be made with the other heads of the smaller departments. Only if they were happy with a new innovation would the head of department then put it to the entire staff of their department and

obtain feedback from all of them. Once a decision had been made, the procedure carried out would be similar to that at the school level, except that everthing would be conducted within the department.

4.1.8 Conclusion

Barnaby Comprehensive was run in a fairly organised manner with daily meetings between senior members of staff and weekly meetings of all members of staff to ensure the smooth running of the school. There were always major events organised for the school each term by members of staff, pupils, and parents. These included music and drama festivals, fairs, school visits, parents evenings and socials. All were kept fairly busy with both academic work and extra curricula activities.

Both year and school assemblies were held regularly, the format of which was left to the heads of houses and senior staff. School communion took place each term with communion being served by the Headteacher himself. Attendance at communion was not compulsory but there would normally be a good turn-out for this. One could not help but notice the emphasis on Christian care and concern in the school where a sizeable proportion of the staff professed the Christian faith in an unobtrusive way. The school was also heavily involved with charity work, giving regularly to different charitable organisations a portion of whatever money was obtained at fund-raising activities organised by the school.

The pupils were fairly well-behaved but not without the usual number of "incorrigible" pupils who sometimes made life for the teachers difficult. School rules were generally obeyed and school uniform regulations adhered to. Sixth formers were given a fair share of freedom and responsibility. They did not need to wear the school uniform although what they could wear was kept under a watchful eye. Discotheques and end-of-year parties were organised by the sixth formers where members of staff were invited along and sometimes called in as crowd controllers. An encouraging sign for the school was that for several years, more and more

parents had been wanting to send their children to Barnaby Comprehensive and the situation had been reached where the demand exceeded the available places.

While it was in no way particularly extraordinary or untypical of many comprehensive schools, Barnaby Comprehensive did provide a environment where new innovations could take place at different levels.

4.2 THE ARRIVAL OF COMPUTERS IN BARNABY COMPREHENSIVE

4.2.1 The History

The school obtained their first computers in the summer of 1980 when it bought two PET computers with the use of school funds. One was a 32K PET and the other was a 16K PET. This was viewed as a "trial run" by the Headteacher to see whether teachers would be keen to explore the use of computers in the school. A computer club was also started to generate interest among the pupils. The cost involved in purchasing the computers was approximately £1,300, which was a substantial amount of money for a school to spend at that time. In the winter of 1981, an Anadex printer was donated to the school by a locally based company (the Anadex company itself) as a result of a personal request from the Head of Physics. This printer was useful in enabling hard copies to be obtained from the computer. This paved the way for the administrative uses of the computer. The school also then purchased two ZX81 Sinclair computers with a Sinclair printer. One was obtained from school funds and the other by the computer club via money saved from subscriptions.

When the first two PET computers arrived, their main use was in the Computer Club. With the two PET computers, Stratchlide BASIC and PET step-by-step BASIC were used to teach programming. The Head of Physics (Mr. Bohr) also wrote his own notes which he developed for the Computer Club to learn programming in simple lessons. Lessons were organised by Mr. Bohr on programming every lunchtime and evening (3.30pm-5pm) for students (Computer Club) and one evening for staff. There was an average of four staff members coming during

lunchtimes and four staff members in the evening. This Orientation Course for staff was organised for the '81/'82 academic year by Mr. Bohr to give a very brief idea of the uses of the computers and as a basic familiarisation on the handling of the computers. This offer was extended to every department in the school. In all, an average of about four teachers came along each week to the Orientation Course.

The PET computers were also used to a limited extent by Mr. Bohr for administrative purposes. Some pupils' records (name list, tutor groups, date of birth) were kept on computer files. Form 7s (i.e. the accounted administration form for the allocation of finance) were also kept in this way. In addition, the PET computers were used by Mr. Bohr for some of his own personal analysis of examination results.

In the summer of 1981, the school's Computer Club took part in the Department of Industry's (DOI) software competition and was awarded a BBC computer (Model B) as a complementary prize for participating. The BBC computer arrived in the school in the beginning of 1982. This began to generate interest in the use of computers in the school. The school then made the bold decision to spend another £5,000 on computers. With that amount of money, twelve BBC computers (eleven were Model As and the other was a Model B) with twelve Black and White television sets, and one cassette recorder were purchased for a Computer Studies Class. The new option of Computer Studies was thus introduced into the school. One of these computers was purchased under the DOI scheme which provided a 50% subsidy.

The Headteacher was aware that there were a few keen teachers and heads of departments who wanted to explore the use of computers in their departments. He thus provided the opportunity for individual departments to purchase a computer, if they wanted to. The school offered to subsidize 50% of the cost of buying the computers from school funds. This was left to the heads of departments to decide. Five of the department heads (Science, Geography, History, Mathematics and Commerce) decided to take advantage of this offer. Hence five more BBC computers were ordered in late 1981 and arrived to the school in the summer of 1982. In addition, the Mathematics department went ahead to purchase a class set of twelve hand-held

Sharp computers for class work. These cost £90 each and finance was again obtained from school funds.

When the BBC computers arrived, the Computer Studies option was started and the Computer Club also became more popular as there were more machines available. Mr. Bohr was appointed Head of the Computer Studies Department in addition to being head of the Physics Department. A Computer Studies class of twenty-four (for the 4th year) was introduced in the beginning of the academic year '82/'83. Mr. Bohr also re-wrote his notes on BASIC programming for the PET computers and made them suitable for the BBC computers. These were then used for the Computer Club which ran every lunchtime, except for Mondays where it was reserved for staff only. The evening sessions ceased but Tuesday afternoons (2.30pm-3.30pm) were kept for students. With the BBC computers being available, the orientation course for staff members which began with the arrival of the PET computers was extended to the learning of BASIC programming on the BBC computers. Sessions were held during lunchtimes on Mondays. The initial response from teachers was considered good with about twelve teachers attending it regularly in the first term, but this dwindled to about two per lunchtime as the year went on. This opportunity ended at the end of the '82/'83 academic year. Individual teachers were, however, encouraged to take a computer home during school holidays to familiarize themselves with the computer. At the end of '82/'83, about fifteen teachers had taken up this offer. The timescale of events of the arrival of computers into Barnaby Comprehensive could thus be summarised in Figures 4.1 and 4.2.

There were some teachers in Barnaby Comprehensive who already possessed a microcomputer of their own. These included the Head of Geography and the Head of Home Economics who owned a ZX81 computer each. In addition, three teachers had already attended external computer courses, including Mr. Bohr. The courses Mr. Bohr attended were - a week's residential course on the RML 380Z at the beginning of 1980 and another course organised by the local University in 1981. Another teacher from the Physics department and another from the Mathematics department both attended the Microelectronics Education Programme's INPUT course at the local Polytechnic. Two other teachers had attended the course at the local

Year	Computers	Peripherals	Activities
Beginning of'80	-	-	1. Mr. Bohr went to computer residential course. 2. Mr. Bohr and Head of Maths presented a paper to Headteacher on proposed use of computers. 3. Talk given by Mr.Bohr to staff members at INSET session.
Summer '80	2 PETs	-	1. Setting up of Computer Club. Lunchtime and evening sessions on BASIC programming for Club members.
Winter '81	- Two ZX81s	Anadex Printer Sinclair Printer	2. Orientation Course for teachers. 3. Talk by Mr. Bohr to parents. 4. Three teachers attended comp. course in local Univ. 5. Pupil records kept on computer by Mr. Bohr.
Beginning of '82	One BBC "B"	-	Two teachers on MEP INPUT course.
Summer '82	Twelve BBC "A"s	1 Cassette Recorder	1. Computer Studies Option started. 2. Lunchtime sessions for Club members. 3. Monday lunchtime programming course for staff. 4. Staff encouraged to borrow computer home during holidays.
	Five BBC "A"s		One each for five departments.
	Twelve SHARP computers		For the Mathematics Department.

Figure 4.1 History of Computers in Barnaby Comprehensive

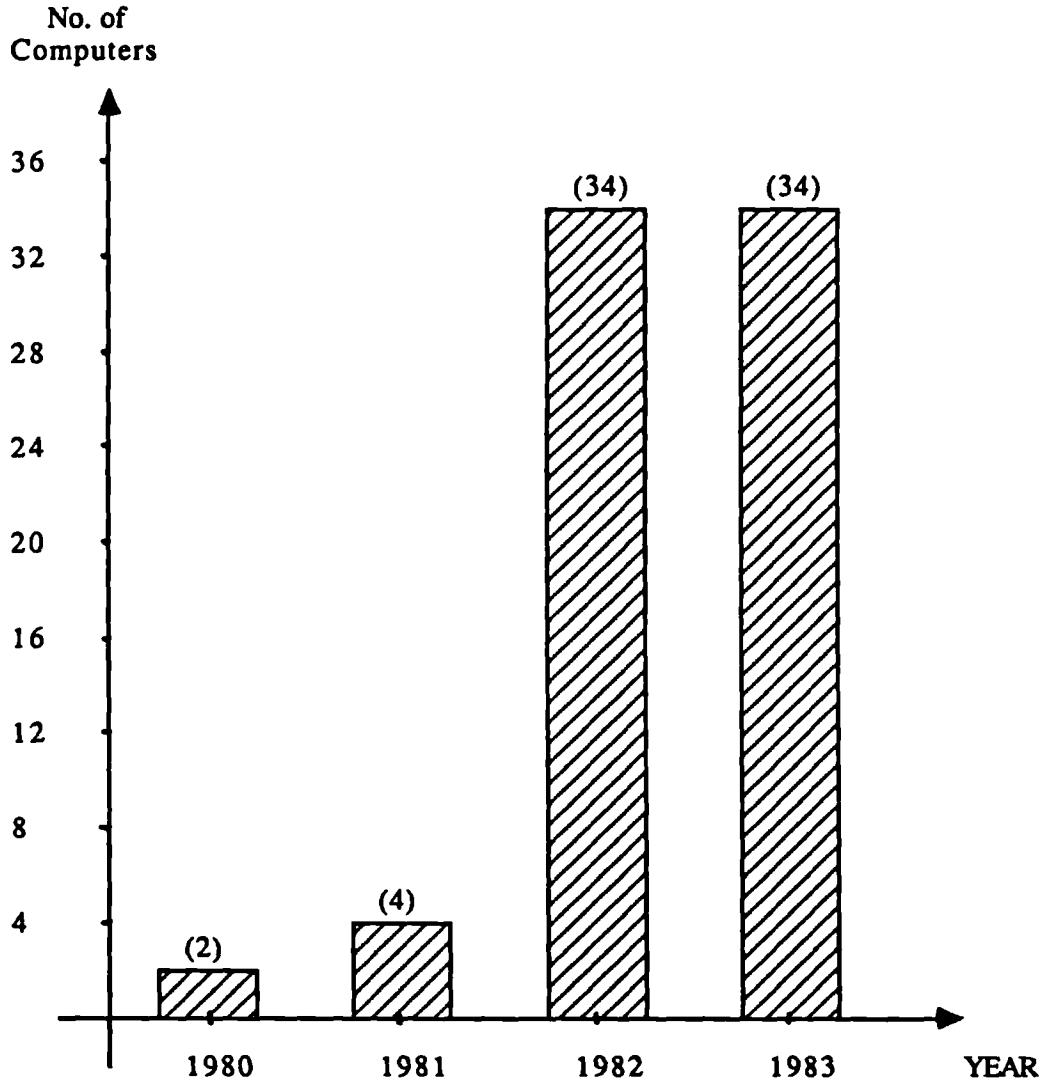


Figure 4.2 Graph of the Growth of Computers in Barnaby Comprehensive

University (with Mr. Bohr) but one of them had already left teaching and the other retired at the end of the academic year '82/'83. Mr. Bohr was seen as the "expert" on computers whom teachers would go to for help and advice. As such, he found himself stretched as the help provided was on a voluntary basis and occupied much of his free time. He had been well appreciated by his colleagues for his keeness and help, although some of them felt that due recognition from the senior staff had not been given to him.

With respect to the use of computers as a teaching resource (i.e. Computer Assisted Learning, CAL), only a few departments were using computers in this way, and this was only as a result of a few keen teachers who had taken the initiative to explore the use of computers in this way. It was only the Geography, Physics, Home Economics and History departments that had attempted to use the computer as a teaching aid. This took place in short periods of concentrated activity involving only a few teachers, once or twice a year. The Physics department itself had used the computer for CAL applications in a very limited way. Only one program (Radioactive Decay) was used for the 6th form.

Software programs were only produced on an adhoc basis. Some students had produced a few programs (but they were not directly suitable for CAL). The Head of Physics kept a copy of the programs but, as yet, there was not a proper software library. Some of the Schools Council's programs had been purchased. The School Council's Economics programs were found suitable but not the Science programs. The Home Economics programs were also found to be suitable because they were found to be flexible and largely data storage programs (DIET). Hence, CAL could be seen to be at a very young and primitive stage in the school. This was the time when the "fieldwork" stage of the research commenced.

4.2.2 The Influences

The main influences behind the purchase of computers in the school were internal. The idea of having computers in the school started during an informal discussion between the Headteacher and the Head of Physics concerning a newspaper article on computers. The Headteacher then

assigned Mr. Bohr and the Head of Mathematics to investigate and produce a paper on the feasibility of the introduction of computers into the school. Mr. Bohr was also given the task of attending relevant conferences, of looking at suitable literature and of speaking to experts in the area. It remained the responsibility of Mr. Bohr to keep up-to-date with the latest in microcomputers in schools and this meant continued visits to various exhibitions, schools (two local schools that already had a number of computers) and talks to both teachers and parents to promote interest. This took the form of organising a talk cum demonstration to members of staff during one of the In-Service Training (INSET) periods. Mr. Bohr managed to borrow a RML 380Z computer and a PET computer and was able to demonstrate some of the uses of the computer which were being developed for education at that time. He also made a detailed study as to the type of computers that they could purchase if the finance was available.

The idea was then presented to the senior staff by the Headteacher as he was aware that there were a few keen teachers and heads of departments who were interested in using computers in their departments for their teaching. It was at this time that the Headteacher decided to earmark £1,000 for the purchase of some initial hardware as a trial run, and the PET computers were then purchased. Part of the trial run included the setting up of the Computer Club and getting staff to look into the possible uses of computers. Mr. Bohr also did a similar presentation on the uses of the computer, this time, with the PET computers that the school had purchased, for the parents of the school's pupils. This was organised by the Parents Association and was, as admitted by Mr. Bohr, a public relations exercise to "sell the idea" of purchasing more computers for the school. About seventy parents came along and the response was good and enthusiastic, with many of the parents agreeing that it was valuable to obtain computers for the school.

The Headteacher, in consultation with senior staff, then made the next decision to invest £5,000 in the purchase of the BBC computers. This time, the Parents Association was also approached to provide approximately £2,000 and it was the Headteacher (who is the chairman of the Parents Association) who made known the target during his 1981 Parents Association AGM speech. The school was aware that they were capitalising on the general enthusiasm

among the parents for using computers in schools. There was the added incentive of the DOI scheme which provided a 50% subsidy for the purchase of their first computer. The Headteacher, through the finance meeting, then committed £2,000 out of school capitation and earmarked £1,000 from school funds (obtained via the sponsored walk) to purchase the twelve BBC computers.

With respect to other sources of influence, there were some parents who individually provided relevant advice and help. As mentioned before, one of the parents donated a twin disc drive from his computing company with the proviso that the school produced one or two computer programs for the firm (a token gesture of appreciation). The role of the Board of Governors in the decision to purchase these computers was minimal. They were only informed of the target. A few qualified personnel on the Board of Governors did however provide some advice.

PART TWO

CHAPTER 5 : TEACHERS AND TEACHING METHODS AND RESOURCES

5.0 INTRODUCTION

A preliminary study was first carried out to find if teachers automatically thought about using computers when asked about teaching methods and resources. This question had to be asked carefully without making the teacher feel that the researcher was trying to find out whether he/she was "good" or "bad" as an innovative teacher. To prevent the teacher from feeling threatened, the researcher decided to look at the teachers' views about teaching methods and resources only in general and not in any thorough detail. It was thought that an interesting outcome of the study would be to find out, whether the views and opinions expressed by the teachers toward teaching methods and resources could be an indication of their eventual use of computers in teaching. It was also thought that the isolation of factors that would enable such a prediction to be made would be useful.

Eventually, it was decided that the survey could best be conducted in the form of an open-ended questionnaire (Appendix C). This meant that the amount of data collected could be kept small (only the number of lines given, any further pages of information being attached as necessary), and yet still be kept open enough to include any other important data.

This questionnaire was handed out to the sixteen teachers (one extra teacher than in the sample chosen) in the five departments that had already purchased computers. Out of the sixteen questionnaires, four were not returned. One of the four teachers (Mr. Coleridge) was away due to medical reasons, and the other three (Mr. Bohr, Mr. Hugo and Mr. Rubens) did not return their questionnaires although they had about three reminders to do so. It was felt wise not to press them any further in order not to jeopardise any future cooperation. One additional teacher than initially planned in the original sample was selected from the Geography department because only one other teacher from this department had responded to the

questionnaire. This teacher (Mr. Mark) was however not included in the interviews on the teachers' views and opinions towards computers.

5.1 ANALYSIS OF QUESTIONNAIRE

To simplify analysis, the data obtained have been tabulated as in Figures 5.1 - 5.15 (and enclosed as Appendix M). This data is categorised according to a personal perception of teacher and pupil participation. The analysis was broadly divided into the Ideal World/Situation, which was defined as a situation where everything that was needed was available or provided and where there are no constraints whatsoever; and the Real World/Situation which was defined as the actual teaching situation. The reasons given by the teachers on the methods and resources used were broadly divided into those that were pupil, teacher, department, school and outside-of-school based. This distinction of Ideal and Real situations was made in order to discover the reasons that teachers had in using particular teaching methods and resources and also to find out which constraints had prevented a teacher from carrying out his or her ideals. The researcher was particularly interested in finding out whether these constraints were external, organisational or personal (i.e. teacher-centred), or whether they were the result of the teacher's consideration for his or her pupils. The reasons given in the figures were mainly taken from the teachers' responses in the questionnaire. It was also important to note that some teachers might have included all of the methods or resources they used, while others might have only mentioned those which were most important to them. Hence the frequency and types of different methods or resources used were not taken into serious account.

The teaching methods used were those which the teachers described but the teaching methods were categorised according to the researcher's personal interpretation of the level of involvement of both teacher and pupil, both before and during the lesson (for teachers, in column 3) and also within or outside the class (for pupils, in column 4). This was done to see whether the teachers or pupils, or both, were active or passive in the various teaching methods used and to what extent this affected their usage. For the pupil involvement, being active was further divided into "writing" and "doing". "Doing" covered those activities that required major

physical and mental activity, while "writing" involved a lot of mental activity besides actual writing for example, problem-solving. Being passive in the class would include listening, straightforward writing of notes, routine exercise work, answering direct questions etc.

The teaching resources used were those which the teachers described but classified under "machine" or "non-machine" according to the researcher's personal interpretation of the types of resources mentioned. Any aid or resource that was mechanical or electrical/electronic was classified as "machine". They were also categorised according to a personal perception of whether it involved a lot of teacher preparation regarding content and the use of equipment to produce it, and also the level of complexity required to use it (i.e. the technical know-how needed). These were classified under three levels - minimum (min.), moderate (mod.) and "a lot of preparation needed or complexity involved". Although worksheets, diagrams, data sheets etc. were by themselves not "machines", nevertheless they were were classified as "machines" due to the fact that machines (for example, photocopying and banda machines) were used to produce them. The level of pupil involvement required for such resources were not categorised because data was not collected on how the teacher perceived these resources should be used. For example, the level of pupil involvement would be very different for diagrams that had been produced only for pupils to attach to their books, than those that required the pupils to label things or to fill in the blanks with relevant information.

5.2 TEACHING METHODS USED

5.2.1 The Science Department

In the Ideal World (see Appendix M, Figure 5.1), the methods suggested by the science teachers were mainly concerned with pupils "doing" things eg. experiments, or even lessons prepared and taken by students. There were also methods suggested which meant a greater participation between teacher and pupils eg. discussions based on visual material or question/answer sessions. One teacher also bravely recommended the application of an open-laboratory concept (which he admitted was not common in the school) where different areas in

the laboratory would be assigned to different work and experiments for individual pupils or very small groups of students.

In the Real World, however (see Appendix M, Figure 5.2), the methods actually used by the science teachers focussed mainly on the teachers themselves. They were the ones that took an active part and a leading role in the teaching eg. dictation of notes, demonstrations or "talk and chalk".

In the Ideal Situation, the reasons given for the use of such methods were mainly focussed on the pupils. It was for the benefit of the pupils that these methods were suggested. Reasons given included the fact that actual participation promoted understanding; that it was stimulating and interesting; and that there was variety provided. With small groups (i.e. smaller teacher-pupil ratios) better social and pastoral care would be achieved.

It was very interesting to note that in the Real World, the reasons given for the methods used were mainly centred on the teacher or the organisation (i.e. department, school or outside school). These included reasons that it was quicker; or that there was a limited amount of preparation time; or that it was cheaper. The fact that examination requirements had to be met was also given as one of the reasons. There was only one reference made to the fact that the ability of the children should be taken into account. All the other reasons given were mainly due to the organisation or the teacher himself/herself.

An unexpected finding was the importance of roleplay in science teaching. However, what the teacher really meant by the use of roleplay in her teaching remained to be seen.

5.2.2 The History Department

In the Ideal Situation in the History department (Appendix M, Figure 5.3), the focus, as with the Science teachers, was on children taking an active part in the lesson. These activities included

fieldtrips, archive work, roleplaying and project work. Even when there was a lecture, this was often followed by a seminar or a question/answer session.

In the Real World (Appendix M, Figure 5.4), the spread of methods that concentrated on both the pupils and teachers was about even. There was the game simulations being done as well as the "talk and chalk" method being used. A certain amount of team-teaching was also being used - some teachers would deliver the lectures while others would follow up with seminars with the same groups.

The reasons given for the teaching methods used in the Ideal world were again mainly for the sake of the pupils. As Mr. Ridley commented, "Many kids, particularly low ability, will learn more in a day's fieldwork than they will in six months in the classroom."

Attention was drawn to the fact that the methods used should depend largely on the ability and level of the pupils. An interesting reason mentioned was that the methods used would also help in staff development.

In the Real Situation, numerous reasons were given to explain the methods used or that had to be used. Some were based on the ability of pupils to easily learn and understand concepts and ideas. Others were based on the view that pupils considered examinations to be important to them and therefore teachers had an obligation to teach pupils to do as well as they could for the specific examinations. Many of the reasons also revolve round the personal capabilities and needs of the teacher.

A large number of the reasons given had to do with the organisation as a whole, both within the department and within the school. These reasons were mainly constraint reasons and had to do with the difficulty of timetabling, or in making arrangements for staff cover. Other reasons mentioned included the lack of finance or resources. The constraints of syllabus and the curriculum were also mentioned, including the fact that there were obligations and datelines

created by examinations. A positive reason given for the use of team-teaching was the fact that it was the philosophy of the department.

5.2.3 The Geography Department

Only two teachers in the Geography department replied to the questionnaire given to them. Of the two, one of the teachers (Mr. Mark) did not mention anything in the Ideal Situation as he could not imagine a teaching situation where there were no constraints.

In the Ideal Situation, the teaching methods used were mainly those that were geared towards the benefit of the pupils. These methods included those of simulation games, roleplaying and fieldtrips. The reasons given by Miss. Constance for the use of these methods were because they "promoted an inquisitive and enquiring mind" and that they taught pupils "how to look and marvel at the world".

In the Real World, apart from the use of simulation games, the other common methods used included exercise work, problem-solving work and "talk and chalk". An amusing method which was mentioned was the use of "busy work" where the teacher would tell her pupils to make notes from certain sections in their textbooks while she got on with her own work. This was often done when the teacher was "desperately tired" or when she had not had time to prepare for the lesson. Sometimes she did this when she just wanted the "kids to shut-up". She admitted that sometimes she would get very tired and that her teaching became a matter of survival - surviving from day to day and thus there was the tendency of generally "switching off". Other reasons given by her included the fact that she might be prodded on because of her own guilt complex because she was afraid of not coming up to her own expectations of what she perceived a "good" teacher should be doing, or that she was getting "set in her ways" in teaching.

Besides these personal reasons given by Miss. Constance, there were also reasons given that were mainly organisational constraints. For example, in arranging a fieldtrip, she perceived that

there would be the problems of staff cover, cost, the booking of the mini-bus, and the general "red-tape" that had to be dealt with whenever a fieldtrip had to be organised.

Miss. Constance felt that whether a teacher was "happy" within the school might also affect his/her teaching. One of the factors affecting this, according to her, might be due to whether the teacher perceived himself/herself as someone worth listening to, especially if they were young teachers. This was reflected as she commented,

"Although I might be young and green, I think I'm worth listening to, along with any young member of staff, because I am not cynical yet and there are too many cynics which often don't care about the job, and I don't think the Head can afford to let us be unhappy".

The only other teacher in the department who replied to the questionnaire mentioned that he used, among others, simulation games as a teaching method. The reason why he used these was because he felt that it was important to communicate an interest of the subject matter to his pupils and he perceived that using simulations provided a way of achieving this.

5.2.4 The Mathematics Department

In the Mathematics department, there was no perceptible difference in the teachers' views of the ideal and real situation (Appendix M, Figure 5.7). This could be interpreted to mean that the Mathematics teachers were realists (i.e. that they had no unfulfilled hopes or ideals in their Mathematics teaching) or that it reflected the fact that the abstract nature of Mathematics did not lend itself to a variety of teaching methods. Possible reasons could be that there were not many teaching methods which were suitable for Mathematics at the secondary level or that mathematics teachers were possibly not exposed to a large variety of methods during their teacher-training.

All three teachers felt that one of the best ways for the teaching of Mathematics at secondary level was the "talk and chalk" method (with many examples shown). This would be followed by a number of problems to work out. They felt that this was a practical way of teaching basic mathematical concepts and obtaining feedback from the pupils on whether they understood

them. One of the teachers felt that direct contact was more important in his teaching, as he said, "Teaching is more than communicating information. It is about personalities and people."

None of them mentioned any reasons that were concerned with the department or the school.

5.2.5 Summary of Teaching Methods Used

In the Ideal Situation, the methods used for the teaching in the Science and the History departments were mainly those that encouraged pupils to take a major role. There was also a greater amount of participation between the teachers and the pupils in the methods mentioned. In the Geography department, one of the teachers gave reasons that had to do with her pupils, while the other teacher could not imagine an "ideal situation" of no constraints. No reasons were mentioned by the teachers in the Mathematics department.

In the Real Situation, the Science department used teaching methods which indicated that the teacher was the key imparter of knowledge. Some of these methods used included practical demonstrations and dictation of notes. In the History department, there was a greater spread of emphasis on the teaching methods used. Both the lecture and fieldwork methods were mentioned as being used. The "talk and chalk" followed by problem-solving work was also used. The reasons given for the use of these methods were that they were for the sake of the pupils and also involved teacher-participation. In the Geography department, the methods used were mainly used because of teacher or organisational reasons. The teacher in the Mathematics department however saw the teaching of Mathematics as mainly the teaching of basic concepts (via lots of examples) with pupils carrying out problem-solving work.

In the Science department, the reasons given for the use of such methods in the Real Situation were mainly constraint reasons. They were either personal constraints from the teacher or organisational constraints from both inside and outside the school. Some of these reasons included preparation time, finance, the use of equipment, parental expectation or constraints of syllabus. In the History and Geography departments, the reasons were more varied and were

concerned with pupils, teachers and the organisation. Some of the reasons given were the understanding and development of the pupils, the personal quality of the teacher, the philosophy of the department, timetabling or the meeting of obligations regarding examinations. In the Mathematics department however, no mention at all was made of the organisation influencing the use of certain teaching methods.

5.3 TEACHING RESOURCES/AIDS USED

5.3.1 The Science Department

There was no obvious discrepancy between the Ideal and the Real Situations (Appendix M, Figures 5.8 and 5.9) in the Science department. The resources that teachers wanted to use and were using included audio-visual materials (16mm film, filmloops, video, OHP) and also books, models and specimens. The reasons given followed a similar pattern to the teaching methods used. The reasons given for the resources used in the Ideal Situation were mainly for the sake of the pupils and teachers. They included the reasons that pupils should learn the art of studying from available material; and that with AVA materials, ideas, concepts and locations could be brought into the classroom which would otherwise be inaccessible. In the Real Situation however, the reasons given were mainly organisational constraints and included those of accessibility, availability, cost and time for making suitable arrangements to use these resources. These reasons for use or non-use of resources in the Science department were mainly due to local organisational constraints i.e. at the level of the department.

Three different types of resources were suggested in the Ideal Situation that were not possible in the Real Situation. They were the use of Computer Assisted Learning (CAL), an open-laboratory and a library. These were not used in the Real Situation mainly because of money and time. From the way the resources had been categorised, another reason that could be derived was that these resources required a combination of a lot of preparation and a high level of know-how (especially CAL and the open-laboratory) - a particular combination which might well prove to be a major factor in whether or not they were used.

5.3.2 The History Department

In the Ideal Situation (Appendix M, Figure 5.10), a number of audio visual materials were suggested and included. Very few reasons however were given for the use of teaching resources in the Ideal World in this department. One reason suggested for the purchase of more books for different ability pupils was so that these pupils could bring the books home for homework. Another reason given was that the use of the Overhead Projector (OHP) provided an opportunity for the pictorial representation of information.

A greater variety of resources and reasons were given in the Real Situation (Appendix M, Figure 5.11). As to whether all of these were used frequently or whether they were used very occasionally is not known as the questionnaire did not attempt to find this out. The reasons given for their use covered a wider range, from pupils' needs to organisational needs. These organisational constraints, as with the Science department, was only at the local level, i.e. at the departmental level. Some of the reasons mentioned for such a choice of resources were that they provided :

- a variety of resources.
- enjoyment.
- effective learning via using these resources.
- a means of maintaining concentration.

Whether the resources were used or were available was, according to teachers, dependent on departmental policy, i.e. the framework and priorities with which the department had decided to operate on, or according to the policies of the head of department. This, in-turn, would affect the amount of money available to purchase and use such resources.

5.3.3 The Geography Department

As was noted earlier, only one of the two teachers in the Geography department gave any examples of resources she would use in the Ideal Situation (Appendix M, Figure 5.12). Miss. Constance would have liked to use different workpacks and books in her teaching. If possible,

she would have liked to use computers too. The main reason given by her was that these resources were suitable for different pupil abilities. She perceived the use of CAL to be suitable for the 6th form although she was unsure as to how she would use it. The other teacher, Mr. Mark, could not imagine a situation of no constraints.

In the Real Situation (Appendix M, Figure 5.13), a greater variety of resources and reasons were given by the two teachers. These encompassed a wider range, from pupil needs to teacher needs to organisational constraints (both within and outside of school). Mr. Mark saw the use of a variety of resources (OHP, Films, Video, Tapes, Maps, Hand-outs etc.) as necessary for different types of pupil groups. For example, he felt that for :

- mixed ability classes, more open-ended work was needed and hence different hand-outs were used.
- for "O" level pupils, a strongly structured approach was essential and so teaching with the use of the overhead projector or blackboard was used.
- for 6th formers, discussions were prefered with the use of maps, specimens etc.

He also highlighted other reasons that would affect his use of resources and included organisational constraints of :

- the availability and cost of these resources.
- the restrictiveness of a syllabus.
- the limited time available to prepare and use resources because of the timetable workloads.

An interesting reason given by Miss. Constance as to why she used a variety of resources was that using a variety of resources prevented her from "switching-off", i.e. from getting bored or complacent.

Two resources that were mentioned in the Ideal Situation but not in the Real Situation were simulation games and workpacks. Again, as with the Sciences, these were the resources that required a lot of preparation. Could one of the reasons why these resources were not used be that the teacher perceived a change of roles ? Were teachers willing to use resources that involved them taking a different role or playing a new part ?

5.3.4 The Mathematics Department

In the Mathematics department, only one out of the three teachers had the resources that he would like to use in the Ideal Situation (Appendix M, Figure 5.14). This teacher would have liked to use more books for more examples and new approaches in teaching. He also would have liked to use videos but was unable to because of the preparation time required and because it had not been planned within the department.

The resources used in the Real Situation (Appendix M, Figure 5.15), in the Mathematics department, were mainly the blackboard, OHP, textbooks, banda material or worksheets. The main reasons were again teacher-centred or organisational factors. For example, a very strong reason for using the OHP was that the teachers could face the class and were therefore better able to gauge the understanding of their pupils and exercise better class control. Another reason was that preparation could be done beforehand. One of the teachers mentioned that she used the resources she did because they were the only ones that she had been exposed to, both during teacher training and during her short teaching career. She did not like using the OHP because she was not "familiar" with it and it involved more equipment and organisation. The use of worksheets and banda material was seen as supplementary to normal exercises as she saw them as a different way of teaching.

The main organisational factor that was given by the teachers for their use of various resources was that they perceived these resources to be readily available. Availability seemed to be a major factor in the use or non-use of resources in the Mathematics department. For example, one of the teachers viewed the use of the blackboard as unsatisfactory but nevertheless used it because it was readily available.

5.3.5 Summary of Teaching Resources/Aids Used

There seemed to be no great differences in the number of resources mentioned in the Ideal Situation and in the Real Situation. What could be noticed, however was that the types of

resources, the frequency with which they could be used, and the "ease" to acquire the skills to use them in the Real Situation were different to those mentioned in the Ideal Situation. For example, in the Science department, the use of CAL or an open-laboratory was seen to require a high-level of technical know-how and preparation and so was mentioned in the Ideal Situation and not in the Real Situation. Teachers saw the benefit of using films, videos, specimens, hand-outs etc. but realised that in the Real Situation, they could only use (or could only use less frequently), for various reasons, a very small amount of what they intended to in the Ideal Situation.

Some of the reasons given for the use of certain resources in the Real Situation were mainly organisational factors. The Science department for example, saw accessibility, cost and time to be major factors in their use or non-use of teaching resources. The History department felt that these factors were mainly dependent on departmental policies and that the head of department played a key role in deciding the types and amounts of resources purchased and used. The Mathematics department, on the other hand, gave reasons that were teacher-centred. They were mainly those of class control, preparation needed and familiarity with the resources used. One overiding factor for teachers in the Mathematics department seemed to be the availability of the resource. For example, Miss. Jackson would use the blackboard even though she did not feel it to be satisfactory. The only reason why she used it was because it was readily available. The Geography department gave a wider spread of reasons, ranging from what would be beneficial to different groups and types of pupils, to organisational constraints (as was already mentioned by others).

5.4 TEACHER AVA PROFILE

From the list of teaching methods and resources used by individual teachers in the Real Situation, a very rough teacher profile could be drawn up indicating whether they were more open and favourable towards teaching methods and resources ("+"), or closed and unfavourable towards them ("-"). The main reasons why teachers used these methods and resources were also noted in the summary sheet (Figure 5.0). What could be observed was that

TEACHER AVA PROFILE

S/No	Teacher	Methods Used	Main Reasons Given	Resources Used	Main Reasons Given	AVA Profile
SCIENCE DEPARTMENT						
1.	Cane	Demonstrations	Quicker; Cheaper; Less amount of equip needed.	Films; Video; Worksheets; OHP; Slides; Cassettes; Wallcharts.	Easily obtainable and recordable; Best ones are expensive, free ones are out-of-date.	+
2.	June	Dictation; Roleplay; Simulations	Preparation time needed; Depends on ability & age of group.	Worksheets; Specimens; Video; Films; Bio. Models; Diagrams.	Tayler made; Readily available; Limited time to prepare.	+
3.	Mikado	Demonstrations; Talk & Chalk.	Limited time; Parental expectations; Constraints of syllabus.	Video.	Time and money.	-
HISTORY DEPARTMENT						
4.	Johnson	Team Teaching; Fieldwork; Problem-Solving.	Limited time and finance; Timetable; Needs to satisfy obligations for public exams.	AVA; CAL; Reprographic Facilities.	Department policy.	+
5.	Joachim	Question & Answer	Inquiry based; Depends on ability of pupils; Survival; Prep time.	OHP; Blackboard; Worksheets.	Availability of suitable material; Time.	-
6.	Malory	Lectures; Visits.	Lack of personal stamina & resources; Pressure of timetable.	Video; Films; Filmstrips; Tapes; Pictures; CAL.	Enjoyment; More effective learning & growing; CAL-only used once a yr.	+
7.	Ridley	Essay-writing; Question & Answer; Fieldwork	Class control; Exams are important; Constraints of syllabus; Tricky to organise; Difficult to obtain cover for teacher.	OHP; Books; Films; Video; Slides; Tapes; Blackboard; Bands/Photo copies.	Variety maintains concentration; Money; Policy of head of department.	+
GEOGRAPHY DEPARTMENT						
8.	Constance	Problem-Solving; Talk & Chalk; Making Notes.	Too much red tape to organise field trips; Constraints of syllabus & curr.; Tired; No time; Easier to put across.	Slides; Films; Books; Handouts; OHP.	Variety; Availability; Money; Not enough resources.	-
9.	Mark	Games Simulations	Trying to communicate an interest.	Specimens; OHP; Blackboard; Films; Video; Slides; Tapes; Maps; Handouts	Depends on ability of groups; Availability; Ease of access; Not enough time because of timetable workload; Constraints of syllabus.	+
MATHEMATICS DEPARTMENT						
10.	Sully	Discussion; Talk & Chalk.	Best way to convey subject; Basic concepts; Feedback.	Blackbrd; Textbks; Worksheets, OHP; Bands Material.	Only exposed to these; Availability; Don't like it 'cos not familiar and more equipment & organisation needed.	-
11.	Joule	Talk & Chalk.	"Teaching is more than communicating information, it is about personalities & people."	OHP; Bands Material.	Like to face class; Able to prepare beforehand; Quick; Convenient.	-
12.	Jackson	Talk & Chalk.	Use to it; Practical.	OHP; Blackboard.	Closer eye on class (class-control); Easily available; Easy to set-up.	-

FIG. 3.8

although the teachers might be innovative and open to different teaching methods and resources, it did not mean that they were not aware of the constraints facing them in wanting to use these methods and resources.

The researcher however felt that not much can be said definitively, although it would be interesting to see whether those teachers regarded as "open or favourable towards teaching methods and resources (+)" from the data shown in figure 5.0 would be the ones who would soon be using computers in their teaching.

5.5 CONCLUSION

The conclusion aims to draw together the overall reasons given by the teachers at the level of the school. The differences within departments have been discussed in detail in the summary sections. Overall, what this analysis has shown was that, with respect to the resources used, there did not seem to be a great difference in the number of resources suggested in the Ideal Situation, and the resources that were actually used in the Real Situation, but that there was however a difference in the nature of the resources used in the Real Situation as opposed to the Ideal Situation. Those resources that were used in the Real Situation (for example, the OHP, blackboard, textbooks) were resources that were less complex technically, where little preparation was needed, and where they could be seen to be the imparter of knowledge. Thus it seemed that teachers were not prepared to use new types of resources, especially if it entailed acquiring new technical know-how, more preparation, and a change of roles played by the teacher.

Other important factors that seemed to affect the resources used by teachers were mainly organisational constraints that tended to limit the number or types of resources used by the teachers. Teachers perceived these constraints to be mainly at the level of the department. These organisational constraints were mainly those of :

1. **Accessibility and Availability.** It was very important for the teachers to know that whatever resources they were intending to use were available and would be readily accessible. If they perceived that it would be a "hassle" to obtain these resources (even though it might be of benefit to the pupils), they were reluctant to use them.

2. **Time.** As mentioned earlier, teachers were less inclined to use resources that took a lot of preparation time. They believed however that this could be made less of a problem if their timetables were suitably arranged to give them more time. They also felt that if the syllabus (and hence examinations taken) could be changed such that there would be less pressure on teachers to complete a syllabus for a particular dateline, then more teachers might be inclined to use more or different types of resources.

3. **Cost.** Teachers felt that whether adequate and suitable resources were purchased for use by them was dependent on departmental policies. They believed that the decisions of the heads of departments to make finances available were key to the use of new or different types of resources.

In the Ideal Situation, the reasons given for the various teaching methods used in the various departments (except the Mathematics department which did not mention anything) were mainly pupil dominated i.e. the focus was on the pupils - for their learning and benefit; but when it came to the actual methods used (i.e. in the Real Situation), the reasons were mainly constraint reasons, both personal constraints of the teacher concerned and organisational constraints (both inside and outside of the school). This dichotomy became more apparent as one moved from the History and Geography departments to the Science department, and became more so in the Mathematics department where teachers in the department could not perceive of an "Ideal" situation.

Possible explanations for the differences noted in the methods and resources used by teachers in the different departments might be firstly, the nature of the subjects taught. For example, Science may have been seen as a specialist subject with specialist knowledge to be

imparted. The methods and resources used were therefore heavily dependent on the teacher as the imparter of that knowledge. In Geography and History, the subjects might have been seen to entail a greater amount of dialogue and exchange of ideas. The methods and resources used thus included both pupil and teacher participation. The very limited number of teaching methods used in Mathematics would imply that Mathematics was a very abstract subject which could only be taught in a very strict and precise way followed by a lot of practice.

Another explanation for the methods and resources used and reasons given could be the nature of teachers who were attracted to the different subject areas. The researcher believes, albeit generally, that the kind of teachers who were interested in human interactions and the events that affected peoples' lives would have preferred, in general, to teach in a way that involved more contact with the pupils and involved them in the world that they were teaching about. On the other hand, Mathematics teachers might have felt that the teaching of their subject was very personal and having no strong departmental policy on the types of teaching methods within the department, might have only aggravated this situation.

A third explanation might be that these subject fields had always been traditionally associated with certain teaching methods and resources. For example, within the school, Science had always been associated with methods which had a large amount of experiments in them. History and Geography, on the other hand, had always been open to different methods and new ways of teaching, while Mathematics had always been seen as the teaching of basic concepts. The methods and resources used had therefore not changed drastically. However, this is only a hypothesis and further study (but not in this research) is required to explore and confirm this in greater depth.

Another aim of this analysis was to try and predict the possible factors, that teachers perceived as important and that might affect their use of computers in their teaching i.e. CAL. It was interesting to note that although there were a few computers already in the school at that time, only five teachers mentioned the use of computers in their teaching (Mr. Mikado, Mr. Johnson, Mrs. Malory, Miss. Constance and Mr. Mark). Mr. Mikado and Miss. Constance mentioned the

use of computers only in the Ideal Situation. Mr. Mikado saw computers as part of his "open-lab" concept where various teaching resources were provided for pupils to use for their learning at their own pace. Miss. Constance on the other hand, saw computers as mainly for data analysis for 6th formers. She however admitted that she was unsure about using them. What "not sure" really entailed remained to be explored. Did it concern the level of complexity involved or the know-how required, or the amount of advance preparation required ?

Two other teachers, Mr. Johnson and Mrs. Malory, mentioned the use of computers both in the Ideal and the Real Situations. Mr. Johnson saw the use of computers mainly for word processing, while Mrs. Malory saw them mainly as a teaching aid (i.e. as Computer Assisted Learning) but admitted that she only used them about once a year. She did not however give any reasons why she would use the computers only once a year. One possible explanation was that she perceived the use of computers as for individual learning and that a batch of computers was needed if there were to be anymore extensive use. Also, she may have perceived only one suitable software program available for her subject area and hence have used it only once a year. The final teacher, Mr. Mark, mentioned the use of computers only in the Real Situation. He perceived computers as being available for use but nevertheless did not attempt to use them in his teaching. Again, no reasons were given.

The purpose of setting this questionnaire was to provide only a preliminary survey of some of the teachers' views and opinions about various teaching methods and resources. No attempt was thus made to thoroughly or extensively analyse the data from the questionnaire. What was attempted however was to provide a general feel of the factors or related factors that may have affected the use or non-use of these teaching resources and methods. Would those teachers that were seen to be open to different teaching methods and resources (+) be the first ones to eventually use computers in their teaching ? It would be fascinating to discover the reasons for this. Would they be mainly personal reasons or would the organisation of the school and department play an important part in them ?

CHAPTER 6 : TEACHERS AND COMPUTERS

6.0 INTRODUCTION

In the interviews with the teachers, a distinction was made by them between how they saw computers in a very general way, for example, in society or industry, and how they saw computers in school and in their teaching (a sample of two interview transcripts is provided in Appendix I). It became apparent that some of them, of their own free will, began to talk about how they saw themselves (i.e. their self-concept) and also how they saw themselves in relation to using computers. A few of them also talked about how they viewed their teaching as they felt it important to mention this in the context of their views and opinions about using computers in school. Teacher profiles were thus drawn up for each of the fifteen teachers to summarise what they said.

As the interview transcripts were analysed, seven categories became apparent which described the general areas teachers most often referred to when talking about computers. Not all of the headings were relevant for all of the teachers and hence not included in the teacher profiles. Some of the comments made by the teachers overlapped into different categories but an attempt was made to put them in the most suitable category. These seven categories of the Teacher Profiles were :

1. **The Teacher.** The biographic data of the teachers, for example, subject taught, numbers of years teaching, qualifications, responsibilities etc.
2. **Initial Contact With and Attitude Towards Computers.** A description of the teachers' first experiences with computers and how they felt about it.
3. **Attitude towards Teaching in General.** Comments made by the teachers about their teaching and themselves as teachers.
4. **Attitude towards Computers in General.** The comments made by the teachers about their views and opinions towards computers and the use of computers in society.

5. **Self-Concept.** The comments made by the teachers with regards to their feelings about themselves.
6. **Self-Concept Related to Computers.** The remarks made by the teachers as to how they saw themselves when considering the use of computers.
7. **Attitude towards Computers in Teaching.** A description of the teachers' views and opinions regarding the use of computers in school and in their teaching.

Teacher Profiles are covered in Section 6.1, and an analysis and discussion of these profiles are described in Section 6.2.

6.1 TEACHER PROFILES

6.1.1 Mr. Cano

Mr. Cano is the Head of the Chemistry and the Science Departments at Barnaby Comprehensive. He is a graduate in Chemistry (BSc) with a PGCE qualification in Chemistry and Mathematics. He is in his early forties. Mr. Cano has been teaching for nineteen years and presently teaches Chemistry although he has taught Mathematics and Physical Education before. He has been in the school for ten years as head of department.

Mr. Cano's other responsibilities in the school include that of being an Area Head and also the person responsible for some of the school's fetes. His outside activities include being involved in the 16+ working party for Chemistry in the Southern Region Examining Board, the Chairman of the CSE Chemistry South East Region Examining Board and the PTA Chairman of the school that his daughter attends.

Initial Contact with and Attitude towards Computers

Mr. Cano remarked that he first became aware of computers three to four years ago (at the time the interview was conducted) while watching the "Tomorrow's World" television programme which illustrated one of the very first computer applications to be seen. As he himself said,

"It was that (Tomorrow's World) that made me think that obviously this was going to be developed and had a lot of potential and then gradually, and I could see that it could be a great benefit in teaching and not only in teaching but in a wider base and right throughout life."

Attitude towards Computers in General

According to Mr. Cano, he was immediately captivated by the intellectual stimulation that the computer provided through the personal use of a computer which he was able to borrow to use at home. As he remarked,

"I can see the enormous potential in it, you know, but I was only learning, playing around with it, but already it gave me the sort of excitement that I suppose most people get when they first of all meet the actual machine... I realise it is absolutely inevitable now. I was pretty certain before but I am convinced now that it is a growing area which nobody, no one is going to stop, but it is going to influence everybody, and it is all the time."

Attitude towards Computers in Teaching

In his view, he saw computers as useful, quick and dynamic visual displays for information, whereby difficult concepts could be explained more easily. For example, simple ideas relating to the movement of electrons could be shown graphically and dynamically, or the computer could be used to simulate a titration experiment.

Mr. Cano said he believed that computers were useful in exploring particular aspects of a major topic in-depth, and for remedial action for small groups or individuals. According to him, he perceived computers to be helpful in the two extreme ends of the pupil ability range, i.e. for the top and bottom ability groups.

Mr. Cano stated that he regarded class management as important especially when there were different groups of pupils with different needs. According to him, at one end, there might be pupils who did not know what to do with computers and who would only want to "play around" and tamper them; while at the other end, there might be pupils who would be so familiar with computers (having one at home or seeing them on television) that they might think that the course available in school was too basic and unattractive. At the same time, he said that there might be others who, because of similar reasons, might expect to use computers in school.

6.1.2 Mrs. June

Mrs. June teaches mainly Biology to the 2nd and 3rd years at Barnaby Comprehensive. She qualified with a BSc and PGCE in Biology. She is in her mid-twenties and has been teaching for 3 years. Mrs. June also teaches the City and Guilds course and is involved with the gifted students group in the school.

Initial Contact with and Attitude towards Computers

Mrs. June said she first became aware of computers in her third year at University when she was doing a data-handling project with no "hands-on" experience, just filling in data sheets. In her opinion, her awareness of computers was then increased through her husband who works with computers.

She said that her first real contact with computers came at Barnaby Comprehensive through Mr. Bohr's computer courses. She reported that she had since borrowed the school's computer to take home on several occasions during the holidays. In her opinion, her initial interest was one of discovering what she could do on computers. As she said, "...I can actually sort of, extend various areas of my knowledge; I can find out things; I can do things; and that sort of thing."

Attitude toward Computers in General

She said she enjoyed the lunchtime computer course where she was learning how to program the computer. She commented that, although difficult, it was a marvellous learning experience, saying,

"Well to me, it was really the value of learning how to put things into the computer; and actually almost not...well being in control of it to a certain extent; deciding what's going to be there, not just pressing a button and this comes up and says 'Press A' and so on. It's me telling it what to do. To me that is very valuable.... So this is sort of having no not power, but being able to do things; being able to see that if I do this, this and this, it will produce that. And it is my choice and not the computer's."

Self-Concept Related to Computers

She said that her initial contact with computers made her feel "old" and unadaptable, and remarked, "That's the first contact I ever had with computers, and it really... I mean, I've just got a bit old... I mean, if I was about two or three years younger, that might have been different."

Although Mrs. June said that she was quite happy to use computers, she also said that she considered herself ignorant and inefficient because she lacked experience. She expressed doubts about using computers in her teaching because she said that she lacked the expertise to be able to firstly, know what was available in terms of ideas for use, secondly, find relevant material and suitable software, and thirdly, adapt present software. As she commented,

"It is interesting for me to see what I can do on the computer but I'm not really efficient at it... I'm so lacking in experience with them I don't really think I can use them very much... I do feel rather ignorant, which is a shame... I'm beginning to understand them a bit more of what they can do in my field but I don't know enough yet even to see really what we can do. I don't even know what people have written, what books, programs they have written... I just don't know enough about how I could adapt and be using more software.... I suppose as a Biologist, what I could learn how to put in, wouldn't actually help me very much because I doubt I would learn quickly enough and fast enough to actually begin to make things available for the subject."

Attitude toward Computers in Teaching

In Mrs. June opinion, the use of computers introduced a different way of teaching, providing a new perspective to stimulate pupils to think. She went to argue that if she used computers too frequently they would then no longer have the statue of a "new teaching method" with all the advantages that new teaching methods have, saying,

"I think that can be quite important because you know, it is a different way of teaching them something... a different way of looking at things If you could just stimulate a little bit more, you know make them think, I think that's quite good... I wouldn't like to use them too frequently in one subject because I'm sure that would lose its point. It's almost not because of its novelty value but while it's a different teaching mechanism, I think that will be good."

Mrs. June said she considered it worthwhile to use computers if only to provide keyboard experience for the pupils. It was her view however that it was important for pupils (especially her "not very bright pupils") to see the effect of the information they put into the computer. Otherwise, she said it would be a hindrance as they might not understand what was happening and would only become even more confused. As she commented, "They quite enjoy fiddling away with figures and information but I don't think it means much to them...unless they can actually see what is affecting various things, I don't think that will teach them very much."

She said she was afraid that the brighter pupils would get the most benefit from the computers and she said that she was worried that she would not know how to get the less able children involved with computers.

6.1.3 Mr. Mikado

Mr. Mikado presently teaches Physics at Barnaby Comprehensive. He had previously taught Science and PE in the school. He qualified with a Teachers Certificate in PE and in Education, and recently obtained a BA with the Open University in Technology and Computer Studies. He is in his mid-thirties and has been teaching for fourteen years, twelve years of which have been at Barnaby. Mr. Mikado is also a Head of House and is involved with the school's rugby team.

Initial Contact with and Attitude towards Computers

Mr. Mikado said that his first contact with and interest in computers came through his brother, a qualified Computer Scientist. He reported that he had further contact with computers through the foundation course of the Open University where his interest in computers began to grow. At the same time, the school purchased their first computers and he said he received encouragement from Mr. Bohr in using computers. This was also at the time when Mr. Mikado decided to change his career from being Head of PE to teaching Physics and also Computer Studies. All these events, according to Mr. Mikado, thus fitted together at the appropriate time to encourage his interest in using computers.

Attitude towards Computers In General

Mr. Mikado remarked that he became aware that computers were becoming very important in education as well as in other areas. The more he delved into computers, the more, he said, his interest in them grew. As he himself commented, "...the more and more I studied it, the more and more I got into it, the more and more I liked it; the more you liked it, the more you picked it up....and so on."

Self-Concept

Mr. Mikado said he considered himself to have had a scientific, mathematical and logical turn of mind since childhood. As he said,

"...ever since I had been a kid, it's been Mathematics and Physics bent. I was interested in anything like that, you know. Anything mechanical or electrical. Basically from hobby and also wanting to use one's brain in a logical way rather than one would say, more an obtuse way in areas of, say for example, humanities and philosophy where one can be right no matter what view one takes. Whereas at least in sort of things like Physics and Mathematics and what not, there is only basically one end product. And that is everybody has to agree on that end product, you know, the Mathematics is how you get there."

Attitude towards Computers in Teaching

Mr. Mikado said he believed that computers provided a good motivational tool for low-ability pupils, and that it was important for pupils to be familiar and confident in using computers in society. As he remarked,

"...it's also a marvellous motivation tool. It's individual. It's a plaything to begin with, marvellous plaything. But from then on, even the most dull kids can get something out of it... My main aim in that is to give them the idea that the computer is an aid that they can control and that pressing buttons on a computer will not make it blow up. So they get used to it because they're going to get... they need to get used to it. Even if they only end up getting their cash out of a cash point, out of a bank, they would know that if they press the wrong button, it doesn't matter."

Mr. Mikado perceived, in his view, several snags in using computers. Firstly, there was the hardware problem of slow program cassette loading. According to Mr. Mikado, one solution would have been to purchase a network system linked to a disc drive. Another benefit from a network system would be that, in his opinion, a member of staff could monitor and actually come in on the students' work if help was needed before they made too many mistakes, got discouraged and gave up. Secondly, he commented that there was the problem of having sufficiently good educational software especially for low-ability pupils, for example, software that would be able to recognise poor spelling (as opposed to "syntax errors").

6.1.4 Mr. Bohr

Mr. Bohr qualified with a PhD in Chemistry, a BSc in Physics and Chemistry and a PGCE in Physics. Mr. Bohr is in his mid-thirties and has been teaching for four years after having spent several years in research. Three of those years has been at this school teaching Physics for "O" and "A" levels. He is the head of the Physics department which is a sub-department of the Science Department.

Mr. Bohr was the initiator for the introduction of computers and Computer Studies in the school. He was closely involved in both the purchase and use of computers. He is also in charge of the Computer Club which caters for the computer interests of the pupils, and is actively involved in

providing computer awareness courses for different departments and for any teachers who are interested in using the computers.

Initial Contact with and Attitude towards Computers

Mr. Bohr reported that his first contact with computers was through a school friend. This friend went off to be a computer operator and showed Mr. Bohr the mainframe computer he was working with. According to Mr. Bohr, this did not make much of an impression on him except that he (Mr. Bohr) was envious of his friend's job.

In his view, his real involvement with computers came when he arrived at Barnaby Comprehensive when, after an informal discussion with the Headmaster about a newspaper article on computers, he was asked (with the Head of Mathematics) to investigate and produce a paper on the feasibility of introducing computers into the school. Since then, according to Mr. Bohr, he had been closely associated with computers in the school.

As a postgraduate student, Mr. Bohr remarked that he used a computer occasionally in his research, seeing it as a tool for analyses.

Attitude towards Computers in Teaching

Mr. Bohr said he considered that computers could be used in a number of ways - for familiarisation with computer hardware; for high speed calculation; as a source of information (a database for the recording, accessing and manipulating large quantities of data); for computer studies; and for school administration.

In his opinion, he was not impressed with using computers in teaching, i.e. in CAL, and he reported that he very rarely used computers in his classroom teaching. One of the reasons for

this, according to Mr. Bohr, was that he feared there was the danger of using computers to simulate experiments instead of actually doing the practicals. As he complained,

"...for example, you use a computer simulation to replace an experiment when that experiment could in fact be done in the lab. And so instead of the child actualling having the experience of using the apparatus for themselves, they were using a computer simulation.... Well I think it is better for them, although it may be more expensive to drop a couple of thermometers, and to actually use one to take a temperature reading rather than just to read a display on a fluorescent screen... You are not giving them practical skills in using the apparatus. You are just using the computer."

Another reason reported by Mr. Bohr was that he considered present educational software to be very poor and disappointing, with a lack of self-pacing software to teach BASIC. As such, he said he was unprepared to spend large amounts of money on software. As he admitted, "The job that most of them can do can be done quite adequately by a teacher with the normal facilities of a school classroom." Mr. Bohr said he did not see the hardware as being a problem although he admitted that it would be beneficial to obtain a network system with a disc drive so that the loading of programs could be made easier and quicker. Finally, he regarded computers only as tools and not something which could replace the teaching system.

6.1.5 Mr. Johnson

Mr. Johnson has been head of the History department for seven years. He graduated with a BEd (in English, History and Education), completed the Advance Diploma in Education (in Curriculum Studies and Philosophy), and a MEd. At present, he is doing a part-time PhD research. He is in his mid-thirties and has been teaching for eleven years, six of which have been at Barnaby Comprehensive. He teaches History in the school.

He is in charge of the resource centre which involves looking after the AVA needs of the school and making appropriate recommendations of any new equipment needed. He is also involved with the Gifted Children Scheme which involves taking additional lessons and organising a club for them; with the History society; and with the lighting and drama stage work group. Besides this, he chairs the area 16+ working party for History.

Initial Contact with and Attitude towards Computers

Mr. Johnson said he realised that in conversations about schools and teaching, computers were constantly being mentioned. He reported that his first contact with computers was while he was doing his MEd at an Institute of Education, where he met two research people trialling CAL materials. He commented that his initial reaction to them was, as he said, "I was quite excited with the prospects but a bit sceptical about what use they could be for Historians."

When the computers first appeared at Barnaby Comprehensive, Mr. Johnson said that he had a general curiosity which led him to take a closer look at them. In his view, his interest in computers was similar to that of a printing press in that he saw them as potential equipment for use in a professional capacity.

Later on, because of his contact with the research group at the Institute, he became involved with trialling a Census program for a Schools Council's Project. The idea was to see whether an Historian could use the census program independently of the Project. This, according to him, required a three to four year involvement with the program, during which time he said he became very familiar with the computer.

Attitude towards Computers in General

Mr. Johnson said that his general attitude towards computers was one of ambivalence in that he commented that he was simultaneously fascinated by computers as machines with a tremendous potential, but at the same time, saw them as complex machines with a technical mystery attached to them. He expressed his fascination when he remarked,

"I was amazed with what computers can do. You know, truly in the state of wonderment because everytime you go along, they seem to be doing something which is more sophisticated and they're doing it quicker and they're beginning to suggest applications that the ordinary man in the street would not think of; the ordinary classroom teacher wouldn't think of."

But then, his more cautious side was reflected when he commented,

"It's just that things like photocopiers, tape-recorders, filmstrip projectors, television sets are a damn site easier because they have been deliberately designed to make their functions idiot simple. Because they are, by comparison to computers, idiot simple machines. So therefore the level of ability or commitment that you have to have to use them is correspondingly lower.... there is an element of technical wizardry and mystery about them [computers] which either have to be cleared away (the thing have to be de-mystified) or you've got to make experts out of people."

Attitude towards Computers in Teaching

Mr. Johnson raised several key points expressing both his enthusiasm but also his cautious stance towards the use of computers. On the positive side, he said he saw computers firstly as providing a very useful database for both quantitative and qualitative analysis of various data resources could be done. For example in "O" level Economic History where population figures, wages and prices could be used and projections of their interaction could be made.

Secondly, he said he perceived that the word processing facilities of computers would be of tremendous help for the pupils in keeping, manipulating and extracting vast amounts of documentary material which could be printed out at will; and for teachers in producing worksheets, pupil profiles and records etc. Thirdly, he commented that he would use computers in a demonstration mode where computers and monitors would be treated as "live" teaching aids similar to "moveable" overhead projector screens.

Mr. Johnson also reported that he saw a number of dangers in using computers in teaching. Firstly, he said he was quite sceptical about using simulations and would like to see more evidence of good simulations before spending a lot of money on them. Secondly, he said he feared that computers might be regarded as "play-things" when not enough planning and preparation had been put into the lesson. This danger, he said he believed, was linked to the fact that the commercial market encouraged a lot of games playing without teachers thinking critically about the educational value of such programs. As he said,

"I can't see myself, the great educational value of playing some sort of monster games, or, you know, the five thousandth variation of space invaders or packman or whatever it is. I mean even the more sophisticated ones. Alright they might teach finger reactions. They might teach keyboard skills. They might even teach them to think occasionally, you know, in a sort of constructed way; but I think that because there's been such an explosion, a commercial based explosion of programs that I don't think anybody's really have a chance to sit down and look at what's on the market and how that can be harnessed."

Thirdly, Mr. Johnson said he also felt that the expectations of the teachers and pupils for computers to be used in a particular way were raised by commercial practice which could not be matched by schools. If the expectations however were realistic, then, according to him, it would provide an exciting and proper use of computers to expand the dimensions of the subject.

Fourthly, he said he saw the danger of computers becoming elitist toys because there were not sufficient computers for everybody in the school. He said he believed that this would result with the wrong people doing computing for the wrong reasons (although he was unclear as to what this meant). In his opinion, one would also be forced to use computers only for the brightest or the very slowest, or a selection of the middle pupils, because of the insufficient number of computers available.

Fifthly, he said he believed that two levels of teaching or teachers would be created - those who were "into" computers and those who were not. Thus, there would be those who, as he said, "wander around talking knowledgeably about this, that, and the other program and all the frightening range of things there are" and those who did not because they could not.

In his view, he saw using computers as involving a fairly substantial personal commitment from the staff (but not the pupils). As he explained,

"Most people can manage a typewriter. They understand the typewriter. They can cope with a Roneo machine cause it's a simple process. But computer technology requires a big leap in personal commitment. And that I think is one of the stumbling blocks. It's not getting the kids to learn how to use it 'cause they would tell you how to use it quicker than you can look. But it's getting the staff to feel confident with it. And that I think is just going to be a blockage point."

6.1.6 Mr. Joachim

Mr. Joachim has a BA in Politics and a PGCE qualification in History. He teaches History at Barnaby Comprehensive (but not at "A" levels") and has been teaching for 3 years. He is in his mid-twenties.

Initial Contact with and Attitude towards Computers

Mr. Joachim reported that his first contact with computers came during his own school days but this was only marginal, "pressing a few buttons but that's all". Initially, he said he expressed a slight interest as to how computers worked, but later on, he did not have any new impressions about computers because he had nothing to do with them. He only knew that they existed.

Attitude towards Computers in General

He commented that he came into further contact with computers in the present school. According to Mr. Joachim, there was scepticism shown by him at his first introduction to computers in the school during the orientation course organised by Mr. Bohr. He said he was not wildly enthusiastic about computers and only saw them as another piece of machinery to be used by people to whatever ends they wanted to use them.

Attitude towards Teaching in General

According to Mr. Joachim, he saw himself as a fairly traditional teacher using the blackboard a fair bit with textbooks, worksheets and background information sheets and not using a lot of audio visual aids, for example, films. He said he believed that teaching was a very personal thing and that a teacher should not be required to use any particular resource or facility but that the opportunity should be provided and facilities for teaching be made available for anyone who wanted to use them.

More particularly, he said he felt that the first few years in a subject area were the most difficult as the teacher was learning the trade. Having sufficient time to prepare himself and resources to back him up were crucial to what Mr. Joachim saw as a feeling of security in teaching, so he remarked,

"...that's when you get into the game after a while, you know the short cuts and the rules... And also I think that you start off with a blaze of glory and off you go, and very quickly scepticism sets in and you say 'What the hell' and you don't do it."

Self-Concept and Self-Concept Related to Computers

In his view, Mr. Joachim perceived himself as not being a "scientific" person saying he would shy away from anything electronic as he tended not to understand it.

He also said he regarded himself as not a logical person and that he was rough with equipment. Thus he said,

"I mean, with a film projector or an OHP, it's sort of two buttons and the lot comes on and that's it. Well with a computer I think there is a bit more steps to it.... I'm not a terribly logical person. I don't know whether I could handle it - writing a program that is in logical steps. Presumably... you have to have a fairly precise sort of mind.... Film projectors are big things, I don't touch those cause I can never work them out. If I touch anything, e.g. two batteries and a elastic band, it breaks. So I don't tend to take great interest in it. I'm so ham-fisted, I tend to break them so I can just about change a plug and that's the lot."

Attitude towards Computers in Teaching

In his view, using the computer in teaching had two levels - the first was related to the sensible use of the machine in relation to the subject, and the second was about his own knowledge and ability to use computers.

At the first level, he said he felt that computers should involve a fairly important part of the course in terms of content and time. He reported that he would not use computers unless he felt that they added some urgent new dimension to his teaching and that they would be

beneficial and attain some goal that he was trying to achieve with his pupils. To use computers for computer's sake or as a "gimmick" would, in his view, be pointless.

At the second level, he said he believed that the teacher had to be competent with computers, and so feel confident with them, and be able to put this across to the pupils. In his opinion, it was important for the teacher to be seen to be in control of the classroom situation (and in that way, prevent any damage to the computers). As he explained,

"If something went wrong and the kiddies did something, and you did not know what was going wrong, you may end up smashing everything and end up looking like a right burke in front of the kids. So I mean it is this bluff and counter-bluff - 'Oh Sir knows what he is doing' is very important."

In being competent with computers, there were two aspects of expertise which he felt he needed to be able to cope with - the pragmatic usage of computers; and the innovative or creative use of them. So he commented,

"On the lower level there is the idea of where is the plug. And then if one is going to use it, one would want to use it in a meaningful way. It's all very well buying a program.... I mean on one level you just buy a program and just shove it in and know how to use it. Well fair do if that's all what you want out of it. But I'm the type that if I want to use it, I want to start improving things and then having to write."

He had a more fundamental worry about using computers in as much as he believed that they might completely change the way in which teaching took place. In his view, this, in turn, would mean a change in the teacher's role, and in the relationship between teachers and pupils. He argued that with this would come a shift in power and authority. He summarised this in the following way,

"It is a different type of ball game of teaching. Unless you've got students who wouldn't smash the thing up and could generally come to terms with what the machine is because by using the machine you are setting up a different type of discipline, a different type of work ethic. One would have to change the perspectives of the teacher, of your own teaching. It's very much more non-formal and unless you've got kids that come to terms with that and work on their own, you've got problems because you are setting up a new, different... a new way of teaching for the staff because you are having to deformalize to a certain extent your work and that could set up conflicts within the kiddies because they are not used to that."

According to Mr. Joachim, he admitted that he might use computers if there was a positive indication by the school heads that there would be promotional prospects for teachers who used computers in their teaching. As he said, "If one gained enough signals like you are going to get a Scale 3 if you start using computers.... those sort of signals."

6.1.7 Mr. Ridley

Mr. Ridley teaches History at Barnaby Comprehensive. He graduated with a BEd. (History and Education) and is presently undertaking a part-time MSc course in Educational Studies at the local university. He is in his late twenties and has been teaching for four years. He teaches mainly the fourth to sixth form levels. In summer '83, he left for another teaching post.

His other main responsibility is as Head of Careers which involves career guidance and also arranging work experience for the pupils. In this capacity, he felt that he has direct access to the Headmaster to discuss related issues.

Initial Contact with and Attitude towards Computers

He reported that his first contact with computers came when he went with Mr. Bohr to attend a short PET computer course because the school had just purchased their first PET computer. He said he then looked into the possibilities of using computers in careers education but did not find any software of a reasonable price.

Self-Concept Related to Computers

He commented that he did not regard the use of computers in his teaching as beyond his capabilities. However, he did admit that he regarded himself as a busy man who would not embark on anything with the computer unless he had to or if someone were to introduce him specifically to a useful program. As he said,

"I'm the sort of bloke who, because I'm busy, I will not probably do anything with computers until I have to. But if somebody came to me and said 'Right, you know, I've got a... and it's useful to you' and I've read and thought it was, then I would go and learn it. But I haven't got time just to go playing around."

Attitude towards Computers in Teaching

Mr. Ridley said he felt that he would like to use computers in his teaching the same way that he would use a film, a banda or a photocopier, i.e. that they would be only a small part of what he would use in a lesson.

In his view, he perceived using computers in a classroom as requiring considerable planning, especially in the area of pupil discipline, pupil organisation, and also with the type of group that he would be doing it with. He also cited the damage of computers by pupils as an important consideration. As he admitted, "I wouldn't bring it into a group of 5th year disenchanted young people and put one on every desk. I mean, I'll soon be in trouble. I'll have one on the floor before... you know."

As Mr. Ridley was the careers advisor in the school, he made specific reference to the use of computers in careers. He said he would like to see computers being used in careers administration, for example, in writing all the school's references, and as a database whereby pupils could access job or occupational information.

He said he believed that at interviews, employers were keen to hear that there were computers in the pupil's school, although they might not even ask what the computers were being used for. According to him, he felt that parents also had a similar attitude and that about 50% of them saw computers as good for their children. He said he felt however that there were some parents who did not really care and who only saw computers as games machines.

6.1.8 Mrs. Malory

Mrs. Malory has a BA in History, two Masters degrees (one in Education and the other in Theology) and a PGCE in History. In her early forties, she has been teaching for a period of sixteen years, the last three of which has been spent at Barnaby Comprehensive. Besides teaching History, she also teaches Latin and Religious Education and is also the deputy head for the sixth form which means being responsible for the general running of the sixth form, including problems of syllabus and structure.

Initial Contact with and Attitude towards Computers

Mrs. Malory said her first contact with computers was about seven years ago when she was teaching at teacher-training college. The computers were situated in the Mathematics department and, according to her, she began to associate computers with Mathematics and Statistics thinking that they (the computers) did not have "much applications beyond that".

Self-Concept related to Computers

Mrs. Malory reported that she initially saw computers as requiring a mathematical turn of mind, thinking that the computer only worked through numbers. This, according to her, led her to believe that she would possibly be handicapped in learning to use computers, as she said, "I don't operate well through numbers." In her opinion, this became more apparent during Mr. Bohr's course when she tried putting Census data onto the computer and found it quite difficult. According to her, it was only when she came across a program that was verbally based that she began to realise that she could use them. As she remarked, "...it wasn't until he [Mr. Bohr], almost by chance, set me on something that was verbally based, that I think I began to realise that I could have any association with these machines."

Attitude towards Computers in Teaching

Mrs. Malory reported that when her husband bought a Sinclair computer for their dyslexic child to see whether it could help with this specific learning difficulty, she was impressed that the computer was able to isolate the child's weaker senses and reinforce learning via her stronger senses. In her own words,

"I have been very impressed. It does seem that it can isolate a weakness in the learning process of an individual, concentrate on the stronger sense, in this case the visual, and because there is the facility of beaming in information in a visual form and excluding the auditory, it seems that, you know, you could actually get children to make sense of situations and concepts that they are finding very, very difficult in an ordinary way."

She said she felt unable however, to write suitably structured programs for her child. Ideally, in her opinion, she would have liked to obtain a remedial software package to help her child.

In school, she said she had the opportunity to use a History program entitled "Drake's Voyage" given to her by her head of department. According to her, she tried the program out with a group of thirty-two third year pupils, six at a time, with a 6th former looking after them. This was conducted while she taught the rest of the class in another classroom. In her opinion, the program seemed to be successful and she described it in the following way,

"...it was exciting. It was new but I think there was an interaction on an individual level that you can't get very often. You've got a class of 32 with one teacher. So individualised learning, at the pace that the child can cope with, at a level of depth of thinking that a child can cope with, isolated from peer group pressure.... not used exclusively because I think the feeding across the peer group and the feeding of teacher to pupil is also very important.... They absolutely loved it. They seem to get quite a deep understanding of the kind of permutations and possibilities that Drake was playing with."

She commented that she had three main worries about the use of computers in the classroom. Firstly, she said she felt that they were mainly for use with small groups and was uncertain how they would work with a large class, particularly in terms of class management.

Secondly, she said she recognised that it was usually the more able children that got a chance to use the computers and she feared that the less able children would lose out. Thirdly, she

reported that she was worried (mainly because Mr. Bohr was also worried about the same problem), that these less-able children would damage the computers as they were the ones who might have behavioural problems. As she remarked,

"I think there is a problem, a fear that the less able children will wreck the system 'cause, you see, you can't be with them. If it's, you know, not in your classroom, so you are having to send maybe children who have behaviour problems to somewhere else, they cause a nuisance as they go from classroom to somewhere else, by and large that means that senior staff will say, 'Don't you dare let so and so out of your class again because he or she caused a nuisance on the way.'"

6.1.9 Mr. Coleridge

Mr. Coleridge is head of the Geography department. He obtained a teaching certificate in Geography, with drama and remedial education as subsidiary subjects. He is in his early forties and has been teaching for eighteen years, ten of which have been at Barnaby Comprehensive.

Mr. Coleridge is one of the Area Heads of the school. Besides this, he is also heavily involved in other extra-curricula activities such as the printing club and the rugby and cricket team.

Initial Contact with and Attitude towards Computers

Mr. Coleridge reported that his introduction to computers was through a friend who was in business and who had a word processor. They bought a magazine and began to talk about the business aspects of the computer and of its potential. As a result of this, Mr. Coleridge said he began to be interested in computers and wanted to be open-minded about them.

Attitude towards Computers in General

As a result of his conversation with his friend, Mr. Coleridge said he then bought a Sinclair ZX81 computer to find out what it was like. What interested him, according to him, was the potential uses for computers in school and in the classroom. Before his ZX81 computer arrived, he reported that he was able to borrow the school's PET computer to use at home during the

holidays. In his view, he was "bemused and astounded" at the ability of the computer. He talked in a knowledgeable way about computers and programming, stating that he was able to convert programs from one type of BASIC to BBC BASIC for use in his department.

Self-Concept

Mr. Coleridge commented that he took up the opportunity to explore the use of computers in schools because he felt that it was a new area and that he said he was the sort of person who liked new challenges.

Attitude towards Computers in Teaching

According to Mr. Coleridge, he saw several advantages in the use of computers. Firstly, provided there were sufficient computers, he said he saw that computers would be good for remedial work as the use of computers would allow the pupils to go at their own pace. Secondly, he said he believed that the use of computers would allow pupils to test, in a model sense, the results of many different possible calculations and so build a concept without necessarily having to be taught the concept. Thirdly, he said he saw computers as having potential for use in administration and said he felt that it might be easier to encourage other teachers to use computers in this area than in teaching.

Mr. Coleridge said he was acutely aware of the problem of class management if computers were to be used with dull children who might be disruptive or aggressive in large numbers. Mr. Coleridge was concerned at the damage that pupils might do to computers. As Mr. Coleridge himself remarked,

"...well they will, as they will with any other equipment, they will poke their fingers into it and everything else, so that is a problem. They type on the thing as though they've got a hammer in their hands. So one does have to be careful that way because they [the computers] are quite fragile."

Mr. Coleridge also highlighted the concern that, according to him, the use of computers might challenge the traditional role of teachers and questioned how teachers would cope with being the recipient of knowledge as opposed to the giver of knowledge. As he commented,

"Ah that does bring us to a major problem doesn't it, yes. Something I hadn't thought of and that is of course that the teacher may not be able to use it or even worse, the kids may know how to use it better than the teacher. Perhaps that's not worse. Perhaps the teacher can be taught by the children."

Finally, Mr. Coleridge said he saw the computer as just another teaching aid used as only part of a package or project. In his view, he might use the computer in his teaching on an average of once a fortnight, but this was the average of what could be a week of use followed by a long period of non-use. As he said,

"Like any other classroom aid, it's not something I see as a universal thing. It's something that can be drawn in and used at a particular time for a particular purpose providing there's lots of preparation done, preferably by someone else in advance.... It's going to be important from time to time but it's not going to be any kind of panacea for anything. In fact, it will collect dust a lot of the time the same way that overhead projectors and projectors do at the moment... They are going to be a magnificent addition to the available resources... But one must understand that they're limited as to the number of opportunities for doing it and the ways in which it can be used."

He said he believed that there would be further problems in using computers in teaching but was unaware of what these problems might be as he said he had not used the computers extensively in his teaching.

6.1.10 Miss Constance

Miss Constance is a Geography teacher. She has a BSc.(Hons) in Geography and a PGCE in Geography Education. She is in her mid-twenties and has been teaching for 3 years. Although her main subject is Geography, she also teaches Latin to some of the 3rd years. Miss. Constance has since left Barnaby Comprehensive in the summer of '83 for another teaching post.

Initial Contact and Attitude of Computers

Miss. Constance reported that her first contact with computers was at University where she said she had to do a half-unit computer course consisting of computing exercises to learn BASIC, and then producing programs of her own to be used as part of a Geography course. This she said she enjoyed. According to her, her other initial exposure to computers was during her teaching practice where they had a PET computer in the staff room which staff used to "play games" with.

Attitude towards Computers in General

Rather than using computers in an automatic manner of just using programs and putting in the data when required to do so, Miss Constance said she regarded it important to know how the data is manipulated. In her opinion, she would like to appreciate the computer programming involved in running such a program. As she said,

"I can quite happily pump away and follow a suit of instructions and be able to produce a program but not know what I'm actually doing, which is why I make mistakes because I'm not aware of how the computer is interpreting what I put in."

Attitude towards Teaching in General

Miss. Constance admitted that she was just managing to cope with the daily pressures of teaching life and that her main concern was the education of her pupils. As she remarked, "I'm existing. I'm surviving at present....[The] everyday problem is children who have to be taught something and that's the most pressing need at present."

Self-Concept Related to Computers

According to Miss. Constance, she regarded herself as not being a logical person, giving the example that she was unable to play games like Mastermind that required logical thinking. She thus said she considered herself as having "mental blocks" about computers.

Attitude towards Computers in Teaching

The pressures of daily teaching life had not enabled her, in Miss Constance view, to think far enough ahead in respect of the use of computers, which in turn, has affected her thoughts about using computers in her teaching. As she commented, "...I haven't thought that far ahead of how to use the computer myself... I haven't spent ages on computers because it is not the everyday problem."

She said she felt that people had forgotten that computers were only a means to an end, and not an end in themselves; and that they were only a tool. In her opinion, she saw computers as statistical tools, putting data in and producing some sort of analysis or correlation that saved one doing all the Mathematics.

She said she was not convinced about using computers in the classroom. This, she admitted, was mainly due to ignorance on her own part. She said she felt however that it might be useful for simulations but believed that there might be problems in the area of class control and the motivation of thirty children watching one computer screen. She had no actual plans for using the computer in her teaching.

6.1.11 Mr. Hugo

Mr. Hugo teaches Geography and Geology to "O" level, CSE and some "A" level classes at Barnaby Comprehensive. He has an Advance Diploma of Education in Geography, with Biology

and Mathematics as subsidiaries. He is in his late fifties and has been teaching for 34 years, ten of those years having been spent in this school.

Mr. Hugo's main responsibilities (besides teaching) include being the coordinator of the Options scheme for the 3rd years; professional tutor (looking after the probationary teachers in the school); secretary to the school's newly-formed Academic Board; and an Area Head. Mr. Hugo is also involved with a wide range of extra-mural activities in school including the fete committee and the Parents Association.

Initial Contact with and Attitude towards Computers

Mr. Hugo commented that his first contact with computers was 14 years ago (in 1969) on a timetabling course where the emphasis was on how computers could help in the construction of the timetable. He said that his impressions as a result of the course were that computers could not do the timetabling job because they were not flexible enough. According to him,

"...it [computers] can't give and take. They are a bit rigid. They can do what they are told to do and they can do within certain bounds, but they can't give and take in the way in which it is necessary to do in timetabling. After all, you've got a gap where you've got no member of staff. You then got to start manoeuvring everything around and the only way of doing that is mentally."

Attitude towards Computers in General

He came into further contact with computers three years later through his nephews whose parents had just purchased a computer for them. According to Mr. Hugo, what he saw did not impress him as he felt that his nephews were "computer mad" and that all they did was to play with the computer instead of what he calls, "reading and getting into the basics for information". He said he saw no educational value in computers and considered that people could become dependent upon computers and mentally lazy in the basic items, like simple addition. He said he saw this as a way in which computers could be used to brainwash people. As he complained,

"Now if the wrong people got hold of it, I think it's a very serious point in actual fact. You could brainwash... I mean I think of Hitler. If he had a computer working on this, he could have brainwashed very successfully on it... I can see a utilitarian state arising as a result of it."

Attitude towards Teaching in General

In the area of teaching, he singled out the use of audio visual aids, saying that pupils were getting dull because they were over-exposed to them. As he remarked,

"At one time you could show youngsters films and you could guarantee that they would pick up the minutest of detail... Now they see so many films, they see so much television, they are squared-eye, they don't pick up a thing. They sit there like a zombie in front of the machine, and they don't see any of the details."

As such, he said he uses films rarely and only when he is unable put over the point in any other way.

Self-Concept and Self-Concept Related to Computers

Mr. Hugo said he believed that his powers of observation were good and that he liked working things out mathematically in his mind. He however said he felt that he was getting old-fashioned in the sense that he still believed in using his brains for remembering and working things out.

Attitude towards Computers in Teaching

Mr. Hugo said he believed that there should be a fundamental amount of knowledge that every pupil should be able to recall at a moment's notice which should not be left to the computer (for example, mathematical tables, simple addition and subtraction, fractions; and in Geography, this would include basic facts about countries etc.).

The danger he said he perceived was that pupils might think that if there was a machine capable of doing a task for them (for example, drawing graphs) then they should not bother learning the task. In this way, according to him, he feared that computers would make pupils lazy in their

thinking and reluctant to get down to basic reading and information gathering, and so become less knowledgeable and less capable of thinking for themselves. This would result in them being unable to express themselves clearly and adequately.

Although he said he did not perceive it as happening at the present time (because of the insufficient number of computers), he seemed to imply that eventually that computers might replace the classroom teacher and situation, and the way in which information is transmitted. As he commented,

"I don't see that it's going to replace the classroom situation and the..... not as it is at this stage, replace the classroom teacher and the giving of information, either as map form or as note form in the classroom for examination purposes. I don't think that it can do that because at this stage you're talking of one screen. So virtually one computer in the geography department which is not sufficient when you've got a class of thirty."

According to Mr. Hugo, he regarded the computer as a useful, but a poor form of storage and retrieval unit for information and record keeping because he perceived the computer as being unable to keep him in constant touch with any problems arising in his options work. As he explained,

"By doing it and doing it myself, I'm absolutely in touch. I've got everything at my fingertips, whereas if I fed it into a machine, I wouldn't get that feel and I wouldn't know that by doing a small swap around of groupings I could solve problems... basically it is of no use to me on that machine. It's what is in front of me. I've got to be able to see it, to be able to look along it and compare it.... A lot of people have tried their damndest to a... I was going to say educate me on this. Well it's a bit of a joke between Mr. Coleridge, Mr. Bohr and myself on this business. Even the Head enters into it now in trying to get me involved with computers but I'm still a long way from being convinced that they're an advantage in school."

6.1.12 Mr. Joule

Mr. Joule teaches Mathematics and Statistics for "O" and "A" levels. Mr. Joule qualified with a Teaching Diploma in Handicraft and PE, and a BA (Open University) in Education and Mathematics. He is in his mid-thirties and has been teaching for 15 years, of which three years have been at Barnaby Comprehensive.

Initial Contact with and Attitude towards Computers

Mr. Joule stated that his first contact with computers was at Barnaby Comprehensive where he was given the offer by Mr. Bohr to take the PET computer home during half-term with a couple of programs and a set of notes on very simple BASIC programming. Since then, he reported that he has been on a computer awareness course using the BBC computer at a nearby polytechnic. Although he did admit that some of it was good, in general, he said he found it boring and a waste of time as it was geared to teachers who had never handled a computer before.

Attitude towards Computers in General

Mr. Joule admitted to being impressed by the power of computers. He commented that while he was aware of how computers had affected society, for example, computerised banking, he said that they had not affected his own personal life. He said that he realised that computers were still a novelty to him.

He tried to express the dilemma that he experienced about the good and bad sides of computers. On the one side, he admitted of his fear of the potential computers have to store and access confidential information of personal details at the national level, and of the dangers of such power being abused. On the other hand, he said he was impressed that microprocessors were used to aid and help the handicapped. Using his own words,

"Well with anything I'm even more impressed with what you can get inside a little box, you know. Seeing what it can do... Well I find that the implications are frightening when you see some of the potential uses for them in terms of, you know, in a national sort of level, of storing information, access to information, confidential, personal details... You've got to have controls... You don't have a sort of centralised computer-run police state... I'm frightened by the power that it can give to individuals or groups of individuals if it is used in that way, but impressed by the power that it can give to people who perhaps need help. So, you know, you've got the dilemma."

Self-Concept Related to Computers

Mr. Joule said that he regarded himself as being a bit old fashioned and not imaginative or creative enough with his own ideas to be able to use computers in teaching. As he himself said,

"My imagination is not that good. I'm not very creative so I don't really, and never have really, seen the potential myself of what I could do with it. I appreciate it when other people show me what they can do but I don't think I'm creative enough to be able to use one... really with my own ideas... I think, you know, at the end of the day, they are nice machines but at the moment, I'm quite happy just to be a classroom teacher and leave it at that. Perhaps I'm a bit old fashion."

Attitude towards Computers in Teaching

In his opinion, Mr. Joule believed that if suitable software was found, computers, being something different, could be used to brighten up the day of the lower ability groups who struggle and easily get fed-up academically. He said that he saw computers as "glorified calculating machines" and would thus like to use computers for more sophisticated statistical work for "A" levels.

Mr. Joule said that he regarded computers as toys and not important for his work. He gave several reasons as to why he did not see himself using computers in the near future. Firstly, he said did not know computers sufficiently well to use them to produce sophisticated material for the kind of classroom work he does, for example, graphics, colours etc. Secondly, in his opinion, he believed that for the level and the material that he was dealing with, the chalk and talk and overhead projector would be quite adequate and a lot quicker.

Thirdly, it was his view that there were too many things going on in school and that one had to get on with everyday work. Lastly, in his opinion there was still insufficient computer facilities in the school and that computer software was still too expensive.

He said that he was faced with a dilemma - awareness of both his own indifference to using computers in teaching at present, and the inevitability of having to change and use them in the future. As he remarked,

"So, at the moment, I'm just in limbo. I don't feel either way. I'm not going to rush round saying 'No, I'm not having them', at the same time I'm not jumping up and down saying I want one. I feel indifferent, I suppose, really... I suppose, as time goes on it will have to change anyway because they will become, I don't doubt, increasingly more important. And as they do so then we will have to change on the school anyway. The demands from society will make us change.... I don't mind change but, you know, when you do something, it's got to be done properly and not 'hotch-potch'."

6.1.13 Mrs. Jackson

Mrs. Jackson teaches Mathematics in Barnaby Comprehensive. She has a Teacher Certificate in Education in Mathematics. She is in her late twenties and has been teaching for eight years, all of which have been in Barnaby. She recently left school to start a family.

Initial Contact with and Attitude towards Computers

Mrs. Jackson said that her first encounter with computers was via a short computing course as a pupil in 6th form. Although initially interested, she said she felt that this was mainly due to the novelty of the computer. At college, she commented that she had done an ICL computing course which she found difficult because they had changed the type of BASIC language used. She said her feelings towards it were of only doing as much as was needed to pass the course.

She remarked that her first exposure to computers in Barnaby was via the orientation course given by Mr. Bohr. She said that she had not however followed it up since. Although her department had purchased the SHARP pocket computers, she stated that she had not really used them in her teaching.

Attitude towards Teaching in General

It was Mrs. Jackson's view that using the same teaching methods over a number of years had both helped her to become more sure of her work and given her the ability to put ideas across better. This had however, she admitted, led her to be more set in her ways and she said she recognised that changing her way of teaching would be an upheaval. In her opinion, she believed that if she were to use a new method of teaching, it would take about two years to get sufficiently familiar with it to be of benefit to the children. As she herself said,

"I think I have just got used to my way of teaching and I'm quite happy with it... I suppose I'm sort of stuck to the same path all the way through, and now that I'm used to it, I just haven't varied it... Well in changing my way of teaching I think there will be upheaval because then I won't be quite sure of it, and I think that will then come over to the kids, you know, perhaps they wouldn't gain so much from it, because it will be so new to me."

A few years ago, the Mathematics department had to change the Mathematics syllabus to the SMP course. When asked how she felt about this change in view of her liking for stability in her teaching, she replied,

"Oh SMP. Well I mean, that wasn't my choice. That is, you know, inflicted on me, if you like. I mean, that was what the department does so that was what I had to follow. But now I've got used to that way of teaching..."

Attitude towards Computers in General

Mrs. Jackson said that she perceived computers as big size calculators, using them in very limited ways to work out sine and cosine rules.

Although, in her view, computers would be helpful to the children as they would encounter them later on in their jobs and in industry, they would not be of any help to herself. As she commented,

"Well in that they use in industry a lot more, obviously it's helpful for the children to do a computing course. So from their point of view, I see that as being helpful because they have got to know how to deal with all sorts of computers, I suppose, because they are bound to come across them sometime in their work. But that's, you know, they are going to deal with them later. I can't see that it will help me really."

Self-Concept Related to Computers

Mrs. Jackson said she considered herself to be slow in acquiring the knowledge and skills of using computers. In her opinion, she felt inadequate in providing the guidance and help that pupils (for example, her top group) would need. As she admitted,

"I do feel that the pupils will probably know more about it than I will... You know, they've been brought up with them I suppose..... Well basically, the kids seem to pick it up more quickly than I do and so I thought it was best left to people who understood. I can't say that I would pick it up all that quickly. I don't think I would, so I've just left it."

Attitude towards Computers in Teaching

She said she was worried about her pupils using computers, firstly because she believed that it was essential for them to understand the fundamentals of Mathematics first even though some of them might be able to talk "computer language"; and secondly because she said she was afraid that there was the tendency for them to depend on computers as they do with calculators, rather than working things out on their own. As she said,

"I want to see that they have got the skills to do it first of all themselves... I would sooner see that they understand in the first place how to program that, rather than just depend upon its availability, you know, it doing the job for them."

With her lower groups, Mrs. Jackson commented that she was unsure whether they would understand and treat computers as more than just "a bit of fun". She said that she feared that the novelty would only last a short time as she said she felt her pupils would very easily get fed up. Her other fear she commented was that the computers might be damaged by them. As she remarked, "You have to keep a constant eye on the [SHARP] computers to see that they aren't tampered with as well. Make sure that you have 15 back. Yes, with 15 batteries."

In her opinion, she believed that she would make an effort to use computers if the children needed them or that they would inspire more enthusiasm in Mathematics than could the teachers. She however said that firstly, she was not particularly keen to use computers feeling they would not be of much help and secondly, that she had not really looked into computers and was thus not aware of what they could do. As she said,

"I'm not familiar enough with the ways of the computer to say how it could affect me or the school really. So my overall view is that I am not against it but then I don't really want that much to do with it... I would make an effort if I felt the kids needed it but I'm not particularly keen. Sorry."

Mrs. Jackson said that she regarded the change required to use computers in her teaching as very expensive, not just in terms of finance, but in personal terms and in terms of the department as a whole. Mrs. Jackson said however that she recognised the inevitability of her using computers in her teaching as it would become departmental policy to use computers in an introduction course for the 3rd years. As she put it,

"It is going to be very expensive to change the ways of every department so that they are geared towards computers rather than teachers.... I can't see myself bringing out the computers every so often for them to use as part of the lesson because I don't feel that I could deviate from my normal way of teaching that much.... I will have to have a go at it at the end of this year sometime because the head of department would like us to take the 3rd years through a computing course... I don't mind. I just have to prepare myself for it... so long as I have prepared myself fully for it, then I don't mind."

6.1.14 Miss Sully

Miss. Sully teaches Mathematics in the school. She graduated with a BSc (Hons) and a PGCE qualification in Mathematics. She is in her mid-twenties and has been teaching for three years, all of which have been at Barnaby Comprehensive.

Initial Contact with and Attitude towards Computers

Miss. Sully said that her first contact with computers was at University in her first term, where the students were expected to write programs on punchcards. In her opinion, she did not get on

well with the course, finding it difficult because they were expected to pick it up immediately. She said she also did a Statistics course at the University where there was a statistical program available for students to use, this being easier as the program was already written out.

Attitude towards Teaching in General

Miss Sully commented that she regarded herself as traditionally orientated, saying, "I'm very traditional, I think, in the way I teach."

Attitude towards Computers in General

Miss Sully said she realised that more and more people in society were using computers and it was her opinion that computers should thus be used in schools. As she commented, "There are so many people that use it nowadays, they ought to be used in schools really."

Self-Concept

Miss Sully said that she regarded herself as not being a practical person. She said that she saw herself as the kind of person who would use things only if she knew that it would function correctly, and hence realised the need to be more experienced in handling computers. As she admitted,

"I am just not a practical person in... well, that's not the right word but... I don't know really. Just using things... I like to use things where I know that things are going to go right, you know. Whereas things that could go wrong, you've got to be more experienced in them. I think I'm not experienced enough in certain things."

Self-Concept Related to Computers

Miss Sully said that she acknowledged the fact that she found difficulty with and was apprehensive about using computers, particularly because she said she regarded herself as not

competent in using them. She said that this was one of the reasons she had not thought much about using computers. As she herself remarked,

"I'm very apprehensive. That's just my nature about using anything practical until I've absolutely tried it out myself. And it's difficult. I suppose, until you're competent in some things... I don't feel confident in my own ability yet to go to teach it."

Attitude towards Computers in Teaching

When asked about what her attitude was to computers in teaching, Miss Sully expressed difficulty in answering because she said she was unsure as to what "computers in teaching" meant. As she said,

"I mean that's why I'm a bit hesitant about this because I don't know what you mean by 'using the computer in teaching' 'cause I don't know what it is.... Well, I'm still not very clear exactly what you mean by using them in any way, so I can't... I find it difficult in my mind to imagine it."

The only ideas she indicated she had for using computers were to teach programming, to use them for the storing of information and for school administration, for example, in timetabling.

She said that she realised that she was not at the stage of using computers in teaching because she had not been taught how to use them. It was her view that it would be difficult to commit herself to them because she saw them as involving a lot of self-learning on her part. Such effort, she said she perceived, would be over and above that already required for lesson preparation and marking, for teaching, and for the various other school activities which, in her opinion, were already excessive. She said she realised the dilemma that she was in - in that although she did not know anything about computers, she would eventually have to as society would increasingly require pupils to be trained in computers. As she reflected,

"...particularly as a Maths teacher, I think one ought to know more. Yeah. Most jobs are advertising Maths with computers so obviously they regard it as very important now in schools. So I think I ought to. I want to."

6.1.15 Mr. Rubens

Mr. Rubens graduated with a BA in Economics and Social History, and a PGCE in Environmental Studies (with RE and Drama as subsidiary subjects). He teaches Economics and Commerce to the 6th form and is the head of the Economics and Business Studies Department. He is in his early thirties and has been teaching for eight years (four years in a middle school and four years in Barnaby Comprehensive). His other involvement includes leading the school's senior Christian Union.

Initial Contact with and Attitude towards Computers

Mr. Ruben's said that he first became aware of computers at University on a computer course for the Economics students, which consisted of a two-hour long lecture with no "hands-on" experience (i.e. no opportunity was provided for them to work on the computer themselves). His opinion of the course was that, "it was thoroughly boring and most people sort of dropped out...".

On arrival at Barnaby, he reported that he went on a course about using computers in Economics teaching at the local polytechnic. He said this provided him with the opportunity to work with the computers in Economics. Since then, he stated that he had brought his department's BBC computer home several times to familiarise himself with it via the "Welcome" program and a computing book. This, he said, he found useful although he encountered a lot of "syntax errors" (due to typing errors) while actually learning how to do simple programming on the computer.

Attitude towards Computers in General

In his opinion, Mr. Rubens felt that the experience with computers at University had been off-putting because it had made computers out to be terribly complicated and very much "out-of-

touch" for most people. Even though he said that he was now more interested in computers and could see their usefulness through being able to "play with them", he commented that he was still worried that the terminology associated with computers might discourage people from using them. As he said,

"I still think that all the terminology and all the vocabulary and so on that you use with computers and so on is, I suppose like anything really, always off-putting, and people feel inadequate and worried that they might not know what this means and that means, but again, once you've got the familiarity of it I'm sure that will get better.... I must admit myself, having played around one, you know, you realise it is not so frightening as it looks".

Attitude towards Computers in Teaching

Mr. Rubens reported that he saw himself very much as a learner. He also said that some of his pupils might already be able to use computers and were capable of teaching their fellow peers.

He also admitted that he was afraid that the mathematical side of Economics would probably be heightened by the use of computers and thus discourage the pupils from using them. He also perceived that some 6th formers were frightened of computers but thought that this would be overcome through practice and more exposure to them.

Computer demonstrations on how things work and simulations were seen by Mr. Rubens as a useful back-up and reinforcement for lessons, for example, in the form of role-playing where one plays the part of the Chancellor of the Exchequer in running the economy of the country.

One specific use Mr. Rubens said he saw for computers was in a programmed-learning format where individual or small group attention could be given. As he remarked,

"They take you through particular concepts and they try and get you to apply these particular principles to situations... try and find out whether you know the next stage and so on, and that's very useful too because on an individual basis, you know, or again a group working by themselves can try and sort of work it out by themselves really, because sometimes you can't give that sort of individual attention."

6.2 TEACHERS' VIEWS AND OPINIONS ABOUT COMPUTERS AND CAL

6.2.1 Introduction

In the interviews with the teachers, a distinction was made by them between how they saw computers, in a very general way, for example, in society or industry, and how they saw computers in school and in their teaching. From these, a summary was drawn up (the Teacher Profiles) of how the fifteen teachers felt about computers and their use.

It was realised when the interview transcripts were being analysed and the teacher profiles written, that the teachers' replies were being addressed mainly to three areas or domains (although not all the teachers necessarily talked about all the 3 domains). These three domains were recognised to be their views about computers in general, their views about the use of computers in teaching, and their views about the use of computers in school administration. These three domains are looked into more specifically in Sections 6.2.2, 6.2.3 - 6.2.4 and 6.2.5 respectively.

Within these three domains, there appeared three main groups of positive, negative and neutral views held by the teachers about computers. These could be further sub-divided, for example, amongst the positive group, most of them had certain reservations (either criticisms or worries) attached to their positive views; similarly, amongst those who were negative in their views towards computers, there were those who saw computers as unhelpful and those who had a real fear or were totally against computers. Thus, eight categories were formulated, including one category for those teachers who did not mention anything at all. These categories are defined as follows :

1. The **Favourable (+)** category has to do with perceptions held by teachers about computers that are very positive. They are teachers who are enthusiastic about, impressed by or interested

in computers and find them useful. These teachers perceive computers as fascinating, bemusing or impressive.

2. The **Critical (+C)** category includes all teachers who are impressed and enthusiastic about computers but have several critical comments about the way they should be used or about the hardware and software associated with computers.

3. The **Worried (+W)** category includes all teachers who are impressed and enthusiastic about computers but have several worries or fears about their use in and implications for society, themselves and their teaching situation.

4. The **Unfavourable (-)** category has to do with perceptions held by teachers about computers that are negative. They are the teachers who regard computers as unhelpful and as not achieving any real purpose. They consist of teachers who view computers as "toys" and thus not important for any real "work". They also include all those teachers who are worried about the use of computers and have no positive opinion regarding their use.

5. The **Antagonistic (-A)** category describes teachers who are insecure, very afraid or against computers. It includes the ideas that using computers in teaching will make their pupils dependent on machines, lazy in their thinking or incapable of expressing themselves. The teachers in this category are not prepared to envisage a way of teaching that would include the use of computers.

6. The **Indifferent (o)** category describes teachers who are non-committal and unsure about computers. They contain views of computers that are neither positive or negative but are more neutral, for example, those teachers who see computers as just another piece of machinery or as any other audio visual aid that will "collect dust most of the time".

7. The **Uninitiated (?)** category is for teachers who do not have any real perception or ideas about the use of computers in school and teaching. In other words, computers are an unknown entity to them as they have not really used computers neither do they know anything about them.

8. The **Not-Mentioned (NM)** category is for those teachers who did not mention any opinions at all about computers.

These eight categories were then mapped onto the three domains of the teachers' views about computers in general (Figure 6.1), in teaching (Figure 6.3), and in school administration (Figure 6.5). This was to look at why teachers' views were positive or negative, to see if there were any critical factors or cluster of factors emerging, and to see whether there was a hierarchy of importance associated with them.

It should be noted that some teachers had access (or perceived to have access) to different numbers of computers (for example, one computer system in their department, or twelve computers in the computer room), and of different capabilities (for example, the SHARP computers in the Mathematics department as opposed to the BBC computers in the other departments). In addition, some of the teachers were also at different stages of awareness of computers (for example, the technical capabilities of the computers). All these should be borne in mind and held in context as we consider the views of teachers towards computers.

6.2.2 Teachers' Perceptions About Computers in General

When the fifteen teachers interviewed talked about their views and opinions regarding computers in general (Figure 6.1), they made comments on one or both of the following dimensions :

(a). The types of feelings teachers experienced towards computers.

(b). The perceptions that teachers had about the capabilities of computers; and the types of effects computers have, good or bad, on people and society.

An "overall view" of how the teachers perceived computers in general is then provided (Figure 6.2). This is based on the seven categories previously defined (excluding the "NM" category). This is obtained from the combined views of the teachers in the two dimensions mentioned above.

6.2.2.1 Types of Feelings Experienced

Ten of the fifteen teachers made comments which had to do with the types of feelings they experienced about computers. These teachers included :

(a). 4 who had favourable comments and had feelings of how impressed, fascinated, astounded, bemused and interested they were with computers as a result of "being in control" or "hooked" on to the intellectual stimulation which computers provided; or alternatively expressed feelings about the enjoyment of being able to "pump" in the data and use it.

(b). 2 teachers who were critical. One of them felt that as more people in society use computers, schools "ought to" use computers too; and the other felt that it was important to know how data was manipulated by the computers.

(c). 3 teachers who expressed worries which included,

- difficulties associated with computer terminology, for example, that it can be off-putting to people.
- issues related to their own ignorance and inefficiency because of a lack of experience.
- problems to do with the confidentiality of data when the power of computers to store and access data is abused.

(d). 1 teacher who was indifferent, expressing the view that he was not wildly enthusiastic about computers and was sometimes sceptical about them, but did not give give any reasons for his scepticism.

6.2.2.2 Capabilities and Effects of Computers

11 teachers had comments about the capabilities of computers and the various effects computers have on people and society. These teachers included :

(a). 6 teachers were favourable seeing computers as,

- useful, helpful and powerful. One of them used the words "power to help" to describe the potential of computers to help the handicapped, for example, in providing mobility.
- becoming an important and growing influence in education and in society.
- as a tool for quantitative analysis, calculation, and as a database.

(b). 2 teachers was critical about computers, seeing them as complex, technical machines demanding a higher level of ability and commitment by teachers. One of the teachers perceived computers as being helpful only to her pupils but not herself.

(c). 1 of the teachers was indifferent towards computers. He saw them as only another piece of machinery or audio-visual aid to be used.

(d). 1 teacher was unfavourable towards computers only because she saw computers being used by people in the Mathematics department and consequently felt that computers could only be used by people who were mathematical.

(e). 1 teacher was antagonistic towards computers, seeing them as making people lazy and dependent on computers. He saw no educational advantage in using computers.

6.2.2.3 Overall View

Looking at the teachers' comments about their feelings and/or the effects they perceived computers were having on people and society in general, the overall picture (Figure 6.2) is that while there was a tendancy to think positively about computers (they were fascinated, impressed and interested about computers, and saw them as an important and useful tool and a growing influence in education), over half of them had reservations of one kind or another.

Some of them had quite deeply rooted worries or criticisms about computers in general. These worries had to do firstly with the possible abuse of power that computers afford as a result of its capabilities in storing and accessing large quantities of personal data; and secondly with the feelings of inadequacy that arose because of an ignorance about computers and the terminology used. The criticisms the teachers had included the views that the use of computers would demand a greater level of ability and commitment that would be required of them.

Finally, there were teachers who were unfavourable towards the use of computers associating them only with mathematical and statistical disciplines. Others were antagonistic perceiving the use of computers as encouraging lazy thinking, or even worse, as "brainwashing" instruments.

6.2.3 Teachers' Perceptions About Computers in Teaching

When the teachers' perceptions about computers in teaching were examined more closely (Figure 6.3), they were seen to be talking about one or both of the following two areas :

(a). There were those teachers who viewed computers as teaching aids or resources.

(b). There were those teachers who viewed the use of computers as a form of teaching, i.e. as a teaching method.

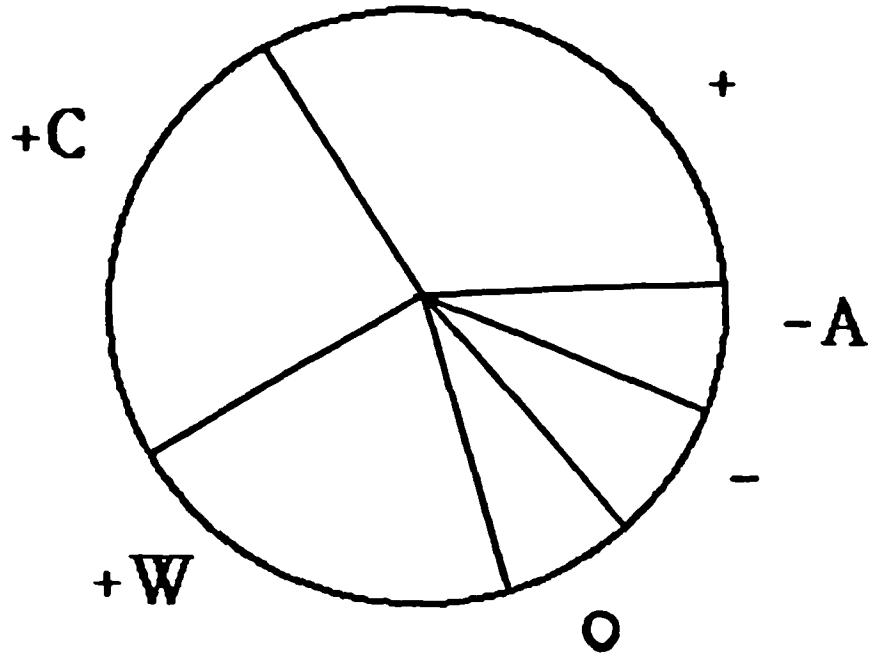
TEACHERS' PERCEPTIONS ABOUT COMPUTERS IN GENERAL :

S/NO	TEACHER	TYPES OF FEELINGS EXPERIENCED	CAPABILITIES & EFFECTS OF COMPUTERS	OVERALL VIEW
1.	Cano	+ * Hooked on the intellectual stimulation of it	+ * A growing influence.	+
2.	June	+W Being in control of the comp. * Marvellous though difficult * Not efficient in it because of lack of experience	NM	+W
3.	Mikado	+ * Liked it.	+ * Growing importance in ed.	+
4.	Bohr	NM	+ * As a tool for analysis.	+
5.	Johnson	+ * Fascinated with potential of computer	+C * Complex machines demanding a higher level of ability & commitment. * Technical mystery/wizardry.	+C
6.	Joachim	o * Skeptical. * Not wildly enthusiastic.	o * A piece of machinery to be used.	o
7.	Ridley	NM	+ * Access to databases for job info.	+
8.	Malory	NM	- * Associated only with Maths & Stats.	-
9.	Coleridge	+ * Bemused & astounded over computers' ability. * Interested in uses for school & classroom.	NM	+
10.	Constance	+C * Enjoy pumping in data but important to know how comp. interprets data.	NM	+C
11.	Hugo	NM	-A * Makes people mentally lazy. * Makes people dependant on computers. * A "brainwashing" instrument. * No educational advantage.	-A
12.	Joule	+W *Impressed with what it can do. * Worried of power it gives to individuals to store & access info.	+ * Power to help handicapped.	+W
13.	Jackson	NM	+C * Just a big-size calculator. * Helps her pupils but not herself.	+C
14.	Sully	+C * Computers "ought to" be used in schools because more people in society are using computers.	NM	+C
15.	Rubens	+W * Interested in it. * Not so frightening as it looks. * Worried that computer-terminology used is off-putting.	+ * Useful	+W

SUMMARY TABLE			
NO.	TYPES OF FEELINGS EXPERIENCED	CAPABILITIES & EFFECTS OF COMPUTERS	OVERALL VIEW
15	10 with Comments 5 No Comments (NM)	11 with Comments 4 No Comments (NM)	
	4 + 2 +C 3 +W 1 o	6 + 2 +C 1 o 1 - 1 -A	5 + 4 +C 3 +W 1 o 1 - 1 -A

Figure 6.1

Teachers' Perceptions about Computers in General



Favourable	(+)	5
Critical	(+C)	4
Worried	(+W)	3
Indifferent	(o)	1
Unfavourable	(-)	1
Antagonistic	(-A)	1

Figure 6.2

As in the previous section, an "Overall View" of how teachers perceived the use of computers in teaching is provided (Figure 6.4).

6.2.3.1 As a Teaching Resource/Aid

12 of the 15 teachers saw the computer as a teaching aid or resource. These teachers included:

(a). 3 who were favourable towards computers seeing computers as,

- useful, quick and dynamic visual displays for difficult concepts.
- statistical tools.
- means of reinforcing learning through the visual medium.

(b). 4 teachers who were critical about computers. While seeing computers as marvellous motivational and teaching tools, they had reservations about,

- the quality of educational software.
- the danger of computers encouraging nothing but games-playing.
- the problems of infrequency of use, i.e. that they are just part of a teaching package that will collect dust most of the time.

(c). 2 teachers were indifferent to the use of computers. One saw computers as just another type of audio-visual aid, while the other saw them as an aid to teach programming.

(d). 3 teachers were unfavourable towards the use of computers. One teacher saw them as only "toys" or "glorified calculating machines" and not suitable for work, while another saw them as poor forms of storage and information retrieval units. The third teacher would not use computers for teaching because he perceived them as being mis-used and treated as just a gimmick.

6.2.3.2 As a Teaching Method

All 15 teachers saw computers as a form or way of teaching, i.e. as a teaching method. Of the 15 teachers :

(a). 2 teachers were favourable towards computers seeing CAL as individualised learning, allowing pupils to learn at their own pace.

(b). 4 teachers were critical towards computers. While they saw the use of computers as a different way of looking at things and useful for small group work, they could see the dangers either of using computers as substitutes for practicals or experiments, or of the computers becoming a hindrance to learning because of pupils not knowing how to use them appropriately. Another important criticism was the danger of the existence of computers in the classroom creating two different cultures - that of the teachers who know about computers and are completely at home with them, and that of the teachers who do not know much about computers and thus largely avoid them.

(c). 3 teachers were worried about computers because although they saw computers as ideal for individual or small group work, they were anxious that only the brighter pupils would have the chance to use computers. They were also anxious about the new set of problems that would necessarily be associated with class management when computers were involved in teaching.

(d). 1 teacher was indifferent, being happy just to be a teacher.

(e). 1 teacher was uninitiated, having no knowledge or idea at all as to how computers could be used in the classroom and as to how that would affect her teaching.

(f). 2 teachers were unfavourable towards computers seeing their use as involving a lot of planning and organisation. They also feared that computers might be damaged by the pupils

and associated this with problems of class control. One of the teachers also mentioned that the use of computers would demand a change in the teachers' role, power and authority.

(g). 2 teachers were antagonistic towards the use of computers. One teacher saw the use of computers as requiring a change in her way of teaching (which she was not prepared to deviate from); and the other saw computers as eventually replacing the classroom situation and teacher.

Thus, in analysing this area of teachers' perceptions about computers as a teaching method much closer, it is interesting to note that most of the teachers saw computers as necessitating some form of change in themselves or in their teaching situation. This is discussed in more detail later in Section 6.2.4.

6.2.3.3 Overall View

When looking at the teachers' overall perceptions about computers in teaching, the general picture (Figure 6.4) is that there were no teachers who were totally favourable about the use of computers in teaching. All of them had either deep reservations or were against the use of computers in teaching. They saw the use of computers as requiring some changes. A more in-depth analysis was thus carried out on the teachers' perceptions in the following section.

6.2.4 Teachers' Perceptions About Computers In Teaching as Changing their Role

It became apparent that most teachers felt that the use of computers would necessitate some changes. The teachers talked about how they saw themselves in relation to using computers. They also described themselves as having to be different sorts of teachers because using computers in classrooms would involve new and different skills in classroom management. As a result of the use of computers, they thus perceived that their teaching situation may be different. In the analysis, therefore, these ideas have been categorised within three areas:

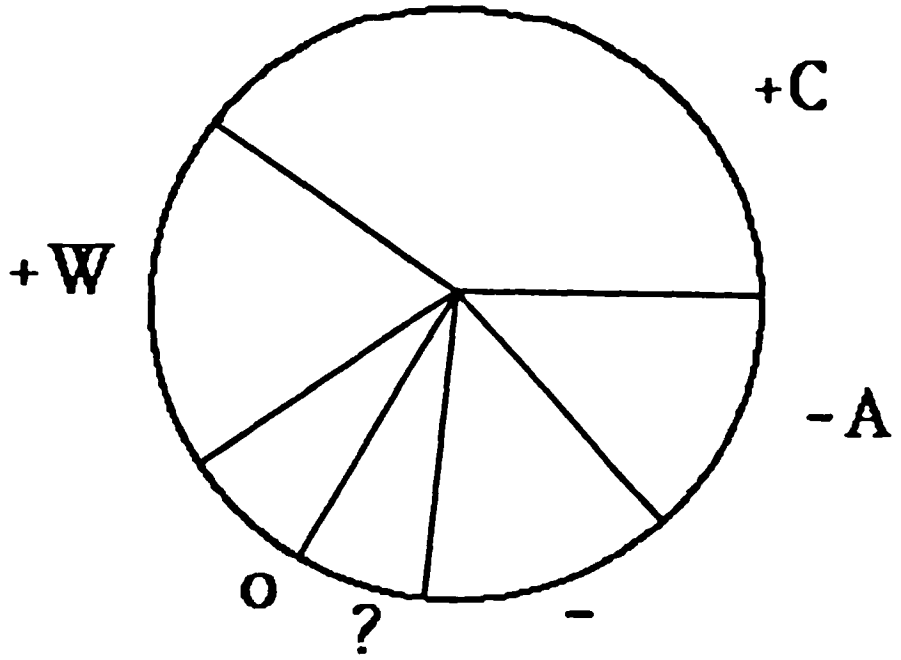
TEACHERS' PERCEPTIONS ABOUT COMPUTERS IN TEACHING :

S/NO	TEACHER	AS A TEACHING RESOURCE/AID		AS A TEACHING METHOD		OVERALL VIEW
1.	Cano	+	* A useful, quick and dynamic visual display for difficult concepts.	+W	* For individual & small group work, for top and bottom groups. * Worried about class management.	+W
2.	June	NM		+C	* A different way of looking at things which stimulates pupils to think. * A hindrance if pupils don't know what they are doing.	+C
3.	Mikado	+C	* A marvellous motivational tool. * Slow loading. * Poor software.	+	* Individualised Learning.	+C
4.	Bohr	+C	* For teaching computing. * For high-speed calculation. * Poor educational software.	+C	* Danger of substituting practicals or experiments.	+C
5.	Johnson	+C	* "Live" teaching aid. * Elitist toy. * Encourages games playing.	+C	* Creates two levels of teaching/teachers.	+C
6.	Joachim	-	* Would not use it as a gimmick or for "computer sake".	-	* Change in teachers' role, power and authority.	-
7.	Ridley	o	* Same as any AV aids.	-	* Involves planning, pupil discipline & organisation. * Worried about computers being damaged by pupils.	o
8.	Malory	+	* Isolates weak senses and reinforces learning through visual sense.	+W	* Interaction on the individual level and small groups. * Worried that only the able pupils will get a chance and the less-able pupils will loose out.	+W
9.	Coleridge	+C	* Only part of a package - will collect dust most of the time. * Remedial work. * Challenges traditional role of teachers.	+	* Allows pupils to go at their own pace and test, in a model sense, different calculations.	+C
10.	Constance	+	* A statistical tool.	+C	* For simulations in small groups. * Not an end in itself.	+C
11.	Hugo	-	A poor storage & retrieval unit	-A	* Eventually comps might replace the classroom situation, teachers and the giving of info.	-A
12.	Joule	-	* Just a toy, not important for work. * A glorified calculating machine.	o	* Just happy to be a teacher.	-
13.	Jackson	NM		-A	* Not prepared to deviate from normal way of teaching. * Dept geared to comps instead of teachers.	-A
14.	Sully	o	* Aid to teach programming.	?	* "I don't know what you mean."	?
15.	Rubens	NM		+W	* Useful back-up for demonstrations and simulations. * Afraid that computers will heighten maths aspect of Economics and so discourage pupils from using comps. * Programmed learning format - for individual and small groups.	+W

SUMMARY TABLE			
NO.	AS A TEACHING RESOURCE/AID	AS A TEACHING METHOD	OVERALL VIEW
15	12 with Comments 3 No Comments (NM)	15 with Comments	
	3 +	2 +	
	4 +C	4 +C	6 +C
		3 +W	3 +W
	2 o	1 o	1 o
		1 ?	1 ?
	3 -	2 -	2 -
		2 -A	2 -A

Figure 6.3

Teachers' Perceptions about Computers in Teaching



Critical	(+C)	6
Worried	(+W)	3
Indifferent	(o)	1
Uninitiated	(?)	1
Unfavourable	(-)	2
Antagonistic	(-A)	2

Figure 6.4

1. In Authority. There was the change that teachers perceived would occur in themselves with regards to their being seen as in charge or in control when computers were used in their classroom situation. This involved their perceptions about the organisation and management of the class, especially with respect to discipline and control.

2. As An Authority. There was the change that teachers perceived would occur in themselves with regards to being seen as an expert in the use of computers. This involved their own perception about themselves in using computers, and also whether they saw themselves as competent and hence confident in using them.

3. Their Teaching Situation. There was the change that teachers perceived would occur in their teaching situation, for example, with respect to group size and composition, or in the transmission of knowledge in the classroom.

To see whether their views about teaching with the use of computers were the same as their views of teaching in general, a further category (**"View of Teaching in General"**) was added to reflect comments, if any, made by the teachers either about their teaching or about themselves as teachers.

Finally, an **"Overall Change"** category was added which interpreted the comments made by the teachers as to whether they saw such a change as good (positive), or bad (negative), or whether they simultaneously saw the change as good and bad.

This has been represented in Figure 6.5.

6.2.4.1 Change In Themselves In Authority

Of the 15 teachers who were interviewed :

(a). 7 had comments, all of them seeing the change as unfavourable. All of them specifically commented on worries or fears concerning class control especially with pupils who might tamper or damage the computers either through mis-handling or shere violence. 2 of these teachers commented that the less-able or dull pupils with behavioural problems might be the main culprits of this.

(b). The other 8 teachers had no comments to make.

6.2.4.2 Change in Themselves As An Authority

With regards to the perceptions teachers held about themselves and their own competence and confidence in using computers, of the 15 teachers :

(a). 9 had unfavourable views about themselves which included,

- teachers who saw it as important to be familiar with computers and not ignorant or inefficient in the use of them. They however expressed the feeling that they felt either "old", "inadequate", "not-practical", "slow", "uncreative", "unimaginative" or "unadaptable" in acquiring the necessary skills and knowledge to use computers; or in the case of one teacher, to write suitable software. One of the teachers saw the acquiring of new skills and knowledge as involving a lot of learning on her part.

- 2 teachers who saw themselves as "not logical" or "not scientific", qualities which they felt were essential if they were to use computers. One of these two felt that he was rough with equipment.

- 1 teacher who cited the worry that the use of computers might create two levels of teachers - those who knew about computers, and those who did not see themselves to be an authority in the use of computers in teaching.

- 1 teacher who felt that he "is but a learner".

(b). 4 had favourable views about themselves which included,

- 2 teachers who saw themselves as having a scientific, mathematical or logical turn of mind. In addition, one of them saw himself as having good powers of observation but did not mention how this would help him to be an authority in the use of computers.

- 1 teacher who said that he liked new areas and challenges, seeing the use of computers as one of those new challenges.

- 1 teacher who said that he saw the use of computers as "not beyond his capabilities".

(c). 2 had no comments to make.

6.2.4.3 Change in Their Teaching Situation

With regards to the change that teachers perceived would occur in their teaching situation, of the 15 teachers :

(a). 9 saw the change as unfavourable. These unfavourable reservations/changes included,

- the fear that the traditional roles of teachers would be challenged, or worse, that the teachers themselves would be changed or replaced, and that the department would be geared towards computers instead of teachers. One teacher went into greater detail, mentioning that this change would occur in the power and authority relationship between

teacher and pupil. According to this teacher, this would mean a change in the "work-ethic" of the teaching situation where the situation becomes more "non-formal". However, he did not further elaborate what "non-formal" meant except to say that it may mean pupils working on their own, and that he sees his own teaching as traditional and hence "formal".

- the concern that teachers envisaged pupils becoming dependent on computers and becoming more lazy, less knowledgeable and less capable of thinking and expressing themselves.

- the change that would have to occur simply because society would require them (school and teacher) to do so in the end.

- the worry that there was a danger of using computers to substitute for practicals or experiments.

- the concern that the use of computers with small groups of pupils as being disadvantagous. Teachers believed that the computers would be used only for the brighter pupils and that the less-able pupils would loose out. One of the teachers felt that computers could become a selective toy for either the brightest pupils and/or the dullest pupils, or a selection of the middle-ability pupils because of the insufficient number of computers available.

(b). 3 teachers saw the change as favourable. These teachers, on the other hand, saw the use of computers in providing individual and small group work for the two extreme ends of the ability range as useful instead of elitist.

(c). 1 teacher simultaneously saw the change as both favourable and unfavourable. He saw computers as useful for remedial work in that they (the computers) would allow pupils to learn at their own pace, but unfavourable in that teachers might have to cope with pupils knowing more

TEACHERS' PERCEPTION OF CHANGE :

I/NO	TEACHER	OVERALL CHANGE	VIEW OF TEACHING IN GENERAL	PERCEIVES CHANGE TO OCCUR IN		
				THEMSELVES		THEIR TEACHING SITUATION
				IN AUTHORITY	AS AN AUTHORITY	
..	Cano	Yes,+&-	NM	Y,- * Handle diff. grps with diff. needs. * Tampering with the computers.	NM	Y,+ * For remedial work. * For two extreme ends of pupil ability range.
1.	June	Yes, -	NM	NM	-ve * Old * Unadaptable * Ignorant. * Inefficient because of lack of experience. * Inability to learn quickly.	Y,- * Brighter pupils getting most benefit.
1.	Mikado	Yes, +	NM	NM	+ve * Scientific, mathematical & logical turn of mind.	Y,+ * For low-ability pupils. * Individualistic.
1.	Bohr	Yes, -	NM	NM	NM	Y,- * Could not replace teaching system but danger of substituting experiments.
1.	Johnson	Yes, -	NM	NM	-ve * Creates two levels of teachers - those those who know and those who don't.	Y,- * Becomes selective toy for brightest or dullest pupils or a selection of middle pupils.
1.	Joachim	Yes, -	Y,- * Fairly traditional. * Teaching is personal. * First few years is spent in learning the trade.	Y,- * Teacher must be competent, confident & in control of the class to prevent computers being damaged.	-ve * Not scientific. * Not logical. * Rough with equipment. * Competence to teacher implies being pragmatic & creative; and knowing the "ins and outs" of the computer & programming.	Y,- * Different type of discipline & work ethic. * Change in role, relationship, power & authority between teachers and pupils.
1.	Ridley	Yes, -	NM	Y,- * Involves planning, pupil discipline & org. to prevent comps being damaged.	+ve * Not beyond his capabilities.	NM
1.	Malory	Yes, -	NM	Y,- * Computers being damaged by less-able pupils.	-ve * Inadequate to write suitable software.	Y,- * Only for small grps. * Only able pupils get a chance, less-able pupils loose out.
9.	Coleridge	Yes, +&-	NM	Y,- * Class control esp with dull children damaging computers.	+ve * Likes new areas & challenge.	Y,+ * Allows own pace. * Remedial work. Y,- * Pupils know more about computers than teachers which challenges traditional role of teachers.
10.	Constance	Yes, -	Y,- * Just surviving. * Everyday problem is the teaching of children.	Y,- * Problems with class control.	-ve * Not logical.	NM
11.	Hugo	Yes, -	Y,- * Pupils are over-exposed to AVA.	NM	+ve * Good powers of obsv. * Like working things out mathematically in his mind.	Y,- * Eventually it might replace classroom teacher & situation and giving of info. * Makes pupils lazy, less knowledgeable & less capable in thinking & expressing themselves.
12.	Joule	Yes, -	NM	NM	-ve * Not imaginative and not creative to use computers.	Y,- * Demands from society will make change.
13.	Jackson	Yes, -	Y,- * Set in ways but will change if dept policy.	Y,- * Computers being damaged by pupils. * Deviates from normal way of teaching.	-ve * Slow in acquiring skills and knowledge. * Inadequate in providing guidance. * Not familiar enough.	Y,- * Dept geared to comps instead of teachers. * Makes pupils dependant on comps.
14.	Sully	Yes, -	Y,- Traditional in the way she teaches.	NM	-ve * Not practical. * Apprehensive. * Involves a lot of self-learning.	Y,- * Society will require pupils to be trained in comps
15.	Rubens	Yes, +	NM	NM	-ve * "only a learner".	Y,+ * For individual work & group working by themselves.
SUMMARY		15 Yes 2 + 11 - 2 +&-	5 Yes 10 NM 5 -	7 Yes 8 NM 7 -	13 Yes 2 NM 4 + 9 -	13 Yes 2 NM 3+ 9 - 1 +&-

Figure 6.5

about computers than they (the teachers) did themselves. In this way, he felt that the traditional role of teachers as the imparter of knowledge would be challenged.

(d). 2 teachers had no comments to make.

6.2.4.4 View of Teaching in General

Although the interviewer did not ask about the teachers' views about their teaching, 5 of the 15 teachers expressed how they felt about it and/or of being a teacher.

Of the 5 teachers, all had comments that had to do with negative aspects of teaching. 2 teachers regarded themselves as traditional in the way they taught, while another teacher felt fairly set in her ways of teaching. Another teacher felt that she was just existing/surviving one day at a time. Finally, one teacher made the comment that present-day pupils were over-exposed to audio-visual aids.

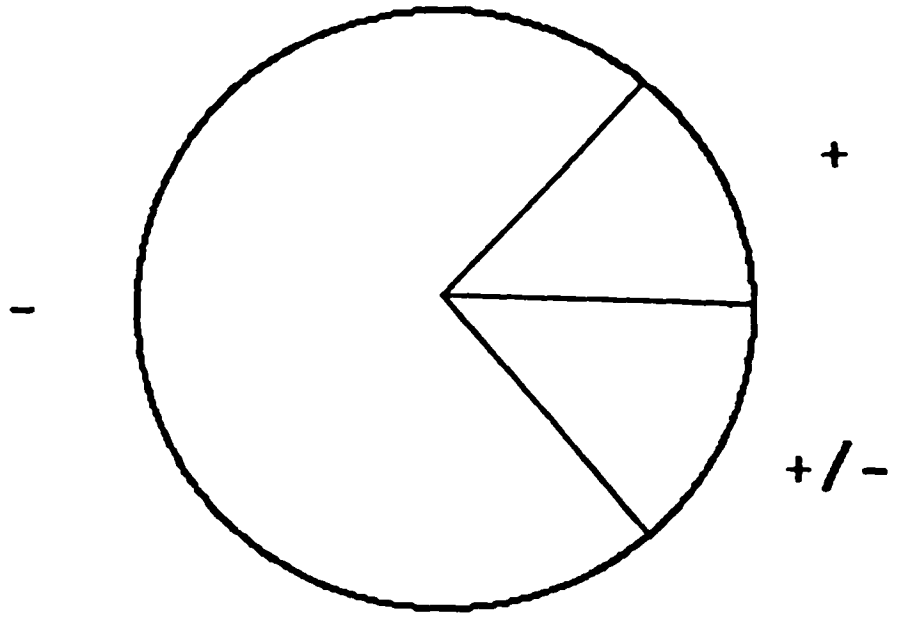
6.2.4.5 Overall Change

All of the 15 teachers expressed the fact that some form of change would take place in themselves and/or in their teaching situation (Figure 6.6). The majority of them (11 of the 15 teachers) saw these changes to be unfavourable, while two teachers saw these changes as favourable. Finally, two other teachers had both favourable and unfavourable views as to how these changes would be.

6.2.5 Teachers' Perceptions About Computers in School Administration

This question was not asked by the researcher, but 6 teachers voluntarily mentioned about their perceptions towards computers in school administration (Figures 6.7 and 6.8). It was found that out of these 6 teachers :

Teachers' Perceptions about Change



Favourable Change	(+)	2
Unfavourable Change	(-)	11
Unfavourable and favourable Change	(+/-)	2

Figure 6.6

(a). 5 teachers were favourable in their views. They saw computers as useful databases (for recording, accessing and manipulating large quantities of data), and word-processors. As such, they felt that computers would be helpful for school administration, careers administration (school's references and job information), for documentation and printing extracts for pupils, and for producing worksheets, pupil profiles and reports for teachers.

(b). One teacher was antagonistic in his views. He was mainly concerned about the use of computers in timetabling and in options work. He felt that computers could not provide him with the necessary information and so would be unable to keep him in constant touch with any problems arising in options work, or to manipulate the possible outcomes readily in options work.

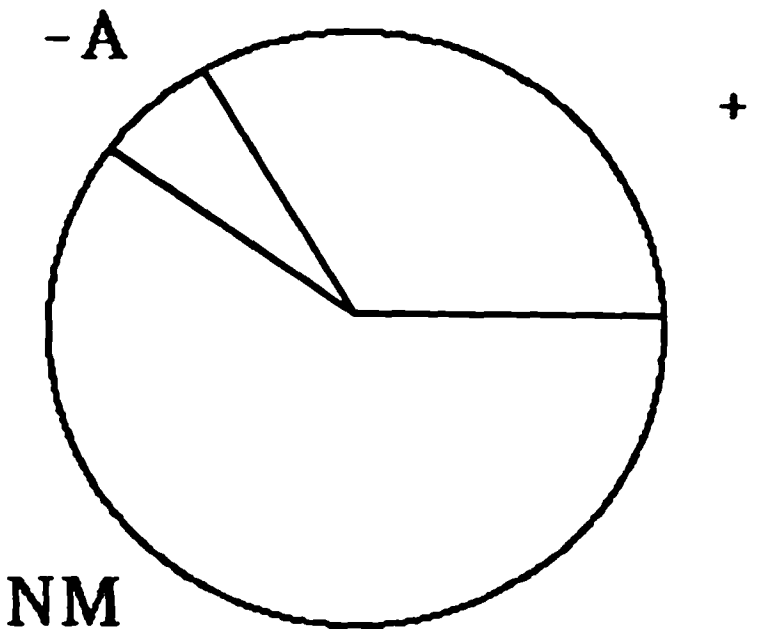
It can also be seen that these teachers were polarised to two extreme ends - they were either favourable towards computers in school administration or they antagonistic towards them. There were no teachers who had views in-between these two extreme ends.

TEACHERS' VIEWS ABOUT COMPUTERS IN SCHOOL ADMINISTRATION :

S/NO	TEACHER	OVERALL VIEW	REASONS / USES
1.	Cano	NM	
2.	June	NM	
3.	Mikado	NM	
4.	Bohr	+	* For school administration. * As a database (for recording, accessing & manipulating large quantities of data).
5.	Johnson	+	* Wordprocessing for pupils (documents & extracts) and teachers (worksheets, pupil profiles & records).
6.	Joachim	NM	
7.	Ridley	+	* For Careers admin, for eg. writing of school's references. * As a database to access job information.
8.	Malory	NM	
9.	Coleridge	+	* Useful in an admin capacity for teachers.
10.	Constance	NM	
11.	Hugo	-A	* For options work, it does not provide data at fingertips.
12.	Joule	NM	
13.	Jackson	NM	
14.	Sully	+	* For storing information. * For school admin, for eg. timetabling.
15.	Rubens	NM	

Figure 6.7

Teachers' Perceptions about Computers in School Admin.



Favourable	(+)	5
Antagonistic	(-A)	1

Figure 6.8

CHAPTER 7 : DEPARTMENTS AND COMPUTERS

7.0 INTRODUCTION

This chapter attempts to examine the interactions involved in the use of computers by teachers in the context of the policies and organisation of their department. It consists of the profiles of the five departments chosen for the study in the school. Even though only one teacher (who was also the head of department) was interviewed in the Business Studies department, it was decided to include this department in the profiles as the experience and strategy of the head of department provides another perspective on how a department head views the use of computers in his/her department and how he/she attempts to encourage their use.

Each department profile includes a simple factual description based on the interviews conducted with teachers, and an impressionistic account based on conversations and observations made in the school. The aim of these profiles is to insert the teachers' views and opinions about the use of computers into the context of the department. In order to achieve this, the comments of the teachers about his/her department's or department head's decision to purchase a computer (the BBC microcomputer), and the organisational problems or "snags" that they perceived they would encounter in the use of computers in the department are analysed.

To facilitate analysis, these department profiles have been sub-divided into several categories which include :

1. **An Overall View.** An initial description of the make up, teaching and leadership styles and resources of the department -

   (a). **Composition.** A factual statement of the number and the nature of staff and pupils in the department. This would include the ages, roles and responsibilities of the teachers in

the department; and the size of the department with respect to the number of pupils it is teaching (for example, CSE, "O" & "A" levels) for the academic year '82/'83.

(b). **Teaching Practice & Support.** A description of the more common teaching methods or styles used by the teachers in the department; the administration and opportunities for discussion provided by the department; and the teaching resources of each department, including its capitation and rooms provided. Mention is also made of the number of computers available in the department at that time, and the location of the computers.

(c). **Impressions.** An overall view of the department by the researcher with specific references to the head of department, the relationships between teachers and the relationships between teachers and the head of department.

2. **Teachers' Organisational Profiles.** This is similar to the teacher profiles in that it is a description of each of the teachers' views and opinions towards the use of computers, but in the context of the organisation and running of the department, together with the constraints they perceive they would find.

3. **Strategies & Politics.** An analysis, at the interpersonal level, of the head of department's strategy (in the purchase and the method of introduction of the use of computers in the department) and the perceptions and reactions of the staff towards that strategy. The main emphasis is on looking at departments and the interaction between the teachers within the department and its head.

This chapter then ends with :

1. A comparison of the leadership styles of the heads of departments, and the reactions of the teachers to the strategies of introducing the use of computers in the departments and to their

head of department. This is based on a set of categories formulated by White and Lippitt (1968) on leader behaviour and member reaction in three different social climates of a youth club. They categorised the three different leadership styles as autocratic, democratic and laissez-faire. A summary of the leadership styles of the five departments in the school is provided in Figure 7.1.

2. A summary of the organisational problems encountered and solutions envisaged by these teachers and the heads of departments in introducing the use of computers into their departments. This includes firstly, the collective problems associated with factors like time, class size and level, use, and resources (as organisational constraints are bound to be shared by everyone); and some of the collective solutions suggested by some of the teachers as to how these problems could be minimised, solved or overcome. Some of the teachers were able to see organisational problems but could offer no solutions, while a few were able to envisage some solutions while not formulating the organisational problems they perceived verbally. This is represented in Figures 7.2 and 7.3.

This chapter leads on to the next chapter where these organisational factors and leadership styles are discussed in the overall context of the school.

7.1 DEPARTMENT PROFILES

7.1.1 The Science Department

7.1.1.1 An Overall View

Unlike the other departments, the Science Department consists of three departments - the Chemistry, Physics and Biology departments. This in turn affects, among other things, the way in which resources are distributed and the way in which decisions are made and carried out.

Composition (Staff) - There are a total of eleven members of staff including two part-time teachers in the Science department. Among them are the three heads of departments of Biology, Physics and Chemistry. The Head of Chemistry is also the Head of Science. There is one other senior teacher in the department. He teaches Physics and is one of the Heads of Houses.

Out of the nine full-time teachers, two are in their early forties, two are in their mid-thirties and the rest are under thirty years of age. Only a third of them have been teaching for over ten years while the rest have been teaching for five years and below.

Composition (Size) - The Science Department (consisting of Physics, Chemistry and Biology) had more pupils in its 4th and 5th year option subjects than any other department. During the '82/'83 academic year, the number of pupils taking a Science subject averaged about 200 pupils for each form year. The majority of the pupils was taking two of the science subjects for "O" or "CSE" levels while the rest was taking one or all three science subjects. Thus the number of pupils for each subject were : for Chemistry, approximately 10 "A" levels, 40 "O" levels and 25 "CSE"; for Physics, approximately 15 "A" levels, 70 "O" levels and 35 "CSE"; and for Biology, approximately 15 "A" levels, 65 "O" levels and 80 "CSE" levels.

Teaching Practice & Support (Style) - Being a science department, there was an extensive use of practicals for experiments. The teachers seemed to view practicals as an integral part of their teaching. The use of "chalk and talk" was the other main form of teaching.

Teaching Practice & Support (Administration) - Like the other departments, the science department met during the In-Service Training period about once every three Tuesdays. During that time, general administration and coordination of matters within the department were carried out, for example, matters concerning the syllabus where all three departments were involved (for example, for the lower school in terms of options or movement of pupils) were discussed. The individual departments also meet by themselves once every

three to four weeks after school to discuss specific issues related to their own departments (like syllabus, teaching resources for their specific subject).

Teaching Practice & Support (Resources) - The science department received the largest amount of money for its capitation, compared with other teaching departments as it has three departments within it. 50% of its capitation were distributed within the three departments and the other 50% was for a central fund for common purchases and needs. The three departments obtained equal proportions of the capitation (about 16% each) to cover mainly the purchase of textbooks for the particular department. 30% of the central fund was used for the purchase of stationery like exercise books, paper etc. (i.e. the largest single expenditure), and the other 20% was used for laboratory equipment for all three departments.

It can be said that the science department had only the bare essentials of science equipment to conduct their experiments. Although outwardly one obtained the impression that the science department was one of the financially better-off departments because it was able to employ two technical staff to support the science teaching staff, and because it had three resource/preparation rooms, there was always the constant cry for more and better equipment to meet its teaching needs.

The computer system that was available in the department consisted of a BBC (Model A) microcomputer with a black & white television. The department however did not have a cassette recorder, or any software to run on the computer.

Impressions - The head of department seemed to be a cordial person who commanded a healthy respect from his staff members. He tried his best to consult as many of his members of staff (especially the other two heads of departments, i.e. Physics and Biology) before any major decisions were made.

Relationships within the department were friendly, with closer ties found mainly within the respective departments. Teachers felt free to ask for help and advice from each other, and there was mutual support between staff members. On the whole, relationships within the department extended beyond the confines of the school as there was regular times of sports and social get-togethers (for example, squash games, barbeques, Christmas lunches etc.) which the majority of the staff (including the technicians) enjoyed going to. Most of the day's activity was found in the "prep rooms", i.e. the technical preparation rooms where two technicians work to prepare the apparatus for each of the day's experiments. It was here that the heads of departments could be found for "quick advice" and where the day to day consultations and decisions were made.

One of these prep. rooms was located between the Chemistry and Biology laboratories. It was here that the technicians were based and where orders for the following week's apparatus were placed. The science resource room was also located next to this. In this room, teaching resources (especially textbooks and exercise books) were kept on shelves. The other prep. room was found opposite the Physics laboratories in another part of the building. This was where (at certain times of the day) one would find most of the Physics teachers gathering round for coffee or discussion.

7.1.1.2. Teachers' Organisational Profiles

Mr. Cano (Head of Science Department) - Mr. Cano said he would have liked to start by using the computer with the sixth form as some of the more difficult science concepts were at this level, and then moving down to the 4th and 5th years where they had their "O" or CSE examination work. He said he envisaged using the computer only for a limited amount of time in a particular lesson, just to prove a particular point or to illustrate an idea or principle.

Mr. Cano mentioned that he would like to know more about computers and their potential so that he could feel more certain in allocating money to them. Until he understood the advantages

of using computers better, the purchase of stationery and textbooks were always going to be overriding priorities.

As there was only one computer in the department, he said he realised that he should not be seen to be "hogging" the computer, but that staff members should see the computer as for the entire department and not himself personally.

In his opinion, Mr. Cano believed that, firstly, sensible software should be purchased rather than written by inexperienced teachers who would find it both time-consuming and difficult. Secondly, he said he realised that time was needed to develop his own knowledge and experience in using and handling the computer. Thirdly, he said he firmly believed that advice, help and training from someone else would be essential for progress. According to Mr. Cano, he benefited from the computer orientation course that Mr. Bohr conducted and that he regarded learning some programming as rudimentary and essential.

He acknowleged that he did not make time for computers because, in his view, computers were not his first priority. He however admitted that by being more efficient, he could "create" time for himself. Practically, he realised that, in his opinion, there would be more time available for teachers at the end of term-time, especially in the summer term, as most of the national examinations would be in progress.

In the end, Mr. Cano said he strongly believed that time was a critical factor in the use or non-use of computers in school. In his own words, "It's time. I think that is the worse thing. I think the biggest enemy is time. People will have to make time or time will have to be made for them".

Mrs. June - Mrs. June said she would have liked to start using computers with the 6th form if she were to consider using computers in her teaching. This is because, in her opinion, she felt that it would be easier at that level; that the class size was smaller; and that her 6th form pupils were easier to "feed things into" and they responded more quickly.

In her view, there were insufficient facilities in that the present number of computers in the Computer Studies department were heavily used and that her groups were not sufficiently small. This, according to Mrs. June, thus prevented her from using the computers in her teaching. Furthermore, she said she was unsure how portable the computers were and how that would affect her use of them in the classroom.

According to Mrs. June, she was aware of the head of department's intention, in that the computer which the department had purchased was primarily for the staff to see what was available. There were however, in her opinion, initial frustrations in that there was not a suitable power point near the computer and that the room was cold which prevented her from working on the computer for several weeks. As she said,

"...everytime I wanted to see it, it didn't have a plug on... You know, the whole sort of system... the room it was going to be in had to be sorted out because it was quite cold at that point in time and it needed a fire, for example, so everything had to be moved and the electrical point had to be extended. It's not exactly a minor problem".

Mrs. June said her main frustration was the lack of time to find out more about computers and to be able to plan sufficiently advance. This, she said she felt, was due to the varying pressure of work. As she commented,

"I know that sounds a silly thing but when you get up to your neck, this time of term, to think far enough ahead to decide sort of three to four weeks ahead of when you want to use a particular program that you've got to sort of get everything sorted out, it's really quite difficult... But I, at the moment, am just sort of... I can't keep my head above water in everything".

She said she realised that the pressure of work varied during the year. For example, during the winter term the pressure tended to be greater as a number of free periods would generally be used up for cover as more teachers were inclined to be ill. At the beginning of the year (i.e. in December), there was also the pressure of internal examinations and reports to be done at that time. Whereas in the summer term, in her view, there would be more time available to think carefully about and use the computer.

Mr. Mikado - Mr. Mikado stated that his strategy was to teach his pupils very basic programming with programs that could be expanded, as he said he felt it was important for them to develop the programs themselves. He recognised that by doing this, they might develop both numeracy and literacy skills and be given some theory, in a very simple sense, as to what happens inside a computer. As a result, he said he hoped his pupils might have the confidence to feel that they were in-charge of the computers.

He commented that he was able to use the computers in the Computer Studies Department room as much as he wanted to as his own classroom was next to the Computer Studies room and also because he was in good terms with Mr. Bohr. As such, Mr. Mikado alternated his class once a week between his classroom and the Computer Studies room.

According to Mr. Mikado, one of the major problems he encountered was not having the time to develop suitable programs for his pupils. He said he felt that there was just "no time" because of the pressure of work and the responsibilities that he had in school which occupied him both during and outside school hours. He said he felt a certain amount of responsibility to make available more information and to train properly his fellow members of staff in the use of computers but realised that it was a large commitment on his part with regards to time. As he admitted,

"We as maybe professional computer people, have not educated our fellow staff into what a computer can or cannot do. And therefore they think that they can come along, put it in, put something in, and something is going to come out. They have no idea of programming and basically you are ending up developing programs for them as much as anything. So you know, you encourage them on one hand but it's... time for yourself".

Mr. Bohr - Mr. Bohr was head of Physics and the person who was involved in the introduction of computers into the school from the beginning (see Chapter 4 - Arrival of Computers). He then became head of Computer Studies. Mr. Bohr's concerns were not the same as the other teachers because, as the person who started the innovation, he was able to overcome the initial organisational constraints using the computer in the teaching of Computer Studies, but not as yet in his teaching of Physics. His main concerns were not departmental but had to do with the

school's policies, the Headteacher's strategy and influences outside of school. This is covered in greater detail in the following chapter.

Most of the teachers stated that they saw Mr. Bohr as the key teacher in the use of computers in the school. However, in their opinion, they felt that he was not officially recognised and credited for this responsibilty. As such, no time was timetabled for him to discharge this responsibility and to provide teachers with individual advice.

7.1.1.3 Strategies and Politics

Head of Department's Strategy (Mr. Cano) - The head of department said he believed that the first stage of his strategy would be to actively encourage his staff members to use the computer, but in a quiet way. In his opinion, he consciously tried to make sure that he was not seen to be possessive about the department's computer. This, he said he envisaged could be achieved by setting the computer up and making it available in his room for his teachers. He said he realised however that there was no cassette player available to load programs into the computer (although he was looking into the purchase of one) and that there was insufficient finance to buy any software. The second stage, according to the head of department, would be to conduct a pilot project with one class to investigate the use and value of the computer in a class. He said he would then put the results and findings to the entire staff in the department for them to make a decision as to whether they would want to try it out for themselves in their teaching. In his view, he would have liked his staff to become familiar with the use of the computer which he said he interpreted to be learning "the rudiments of programming". This he said he felt could be acquired either from using the department's computer or by attending the lunchtime courses, and then eventually to write their own programs or adapt existing ones for their specific classroom use. According to Mr. Cano, he hoped that his teachers would explore how the computer could be used in the laboratory situation for all three departments (Chemistry, Physics and Biology). Another intended use of the computer, in his view, would be as a reinforcement or back-up to lessons in the 6th form. As he remarked,

"It is a teacher orientated thing at the moment. And after that, once the staff felt proficient in it, we then introduce it to the 6th formers who also wanted to go in there for say a lunch hour session.... supposing you do a topic, an area of work, and you feel that there could be some information on a tape, and the use of the computer will be a back-up to what you have been doing".

The next stage Mr. Cano had in mind would be to build up a library of suitable software, similar to what they did for video tapes. According to him, he realised however that this was a question of finance, for without sufficient funds he was unable to purchase the appropriate software.

Mr. Cano commented that he was aware of his need to know about the potential of computers so that he would be able to feel more certain when allocating finance for the use of computers. He said he was also very aware that it was the department's responsibility to provide the necessary expertise, advice and training before his members of staff were expected to use computers in their teaching. He said he realised that teachers valued their free time and that they would give time only if it was one of their priorities.

In his opinion, Mr. Cano felt that eventually, teachers would have to see that it was necessary for them to be more informed about computers, and that it was his duty as head of department to impress on them that it was so. As he said,

"Now as the whole thing snowballs and the importance of computers becomes more obvious outside of school, then they would have to see that they have got a duty to be more informed all the time..... Technology is moving along at a fantastic speed and teachers are now aware, particularly the science teacher, that everyone of his students must be much more informed and aware of what is going on outside.... And I think that they feel that they have to make sure that the content of their work is very much put into the right setting and framework for life outside there... I have made this a definite policy in this department."

Teachers' Reactions towards the Strategy - None of the teachers mentioned in their interviews of any ill-feelings about the decision to purchase the computer in the department. As far as it could be ascertained from informal conversations with the teachers, all of the teachers were involved in the discussion of the purchase of the computer, were aware of where the computer was kept, and were aware of the intentions of their head. About half of the science teachers said they were keen to learn how to use the computers and said they took the opportunity to attend,

whenever possible, the lunchtime courses organised by Mr.Bohr, or to borrow a computer to use at home during school holidays, so as to become more familiar with it. They also stated that they were appreciative of the efforts of their head of department and the head of Physics to encourage them to use computers but were also aware of the limitations they (i.e. Mr.Cano and Mr.Bohr) had in terms of resources and time.

7.1.2 The History Department

7.1.2.1 An Overall View

Composition (Staff) - The History department has a total of six members of staff. Four of the six are also holding senior positions in the school. One is the Head of Department, one is Deputy Headmistress, one is Deputy Head of the Sixth Form and the other is Head of Careers, leaving only two with no senior administrative responsibilities. The four senior teachers are above thirty years of age while the other two are in their mid-twenties. Three of the teachers (the head of department, the deputy headmistress and the deputy head of the sixth form) are experienced teachers each having taught for over ten years.

Composition (Size) - Apart from the compulsory English and Mathematics subjects, the History department had the second largest number of pupils in its 4th and 5th year option subject. During the '82/'83 academic year, there were approximately 30 pupils in the 6th form and approximately 130 pupils in each of the 4th and 5th years. Of these, approximately 60 pupils were taking "O" level examinations and 50 were taking "CSE" level examinations.

Teaching Practice & Support (Style) - Team Teaching (which to them was organising lectures and seminars for the pupils with teachers taking turns to do the lectures), was claimed to be practised in the History department. Discussion was made possible in seminar groups after the lectures had been delivered. Each seminar group consisted of about six pupils. This was introduced mainly for the 6th form in 1981. In the lower school, teaching was done in the

traditional manner with one teacher per group, mainly with chalk & talk, but with the occasional use of the overhead projector, slide projector, film strips and videos, and with worksheets.

Teaching Practice & Support (Administration) - In-Service Training (INSET) periods were allotted for the department with an average of about one in three Tuesdays. Issues concerning the department are normally raised by the members of staff and include both administrative concerns as well as curriculum issues.

Teaching Practice & Support (Resources) - The History department was within the lower of the middle range of departments in terms of capitation. The reason was probably because, unlike the Science department, it did not require huge sums of money to purchase expensive chemicals or technical/electrical equipment. This capitation was used mainly for stationery (about 50%), purchase of audio-visual materials and the rest for textbooks, photocopying etc.

The department had purchased a BBC computer (Model A) with a monitor and cassette recorder. The computer system was initially kept with the head of department.

Impressions - The History department seemed to be an organised department, where most of the staff were highly experienced teachers with responsible positions in the school. As a result of this, most of the teachers were quite independent in their teaching and in their views of it, and relationships within the department were mainly on a professional basis. Most of the teachers were open to consider new ways or methods of teaching.

The head of department was seen to be a highly organised person. Various assignments were given to him by the Headteacher which reflected a recognition of such skills. For example, he was asked to look into the audio-visual needs of the school and to recommend the necessary configuration and equipment. This required a certain amount of planning and a large financial commitment. He seemed to have the tendency, however, to go ahead with certain decisions

without full consultation with his staff members as he saw that for certain policies, it was "his job" to make the decisions.

There was a department "office" where resources (for example, worksheets, audio visual aids etc.) were neatly filed away. This was also the office of the head of department.

7.1.2.2 Teachers' Organisational Profiles

Mr. Johnson (Head of Department) - Mr. Johnson admitted that he was fully aware that money spent on a computer could, as he said, "buy 30 nice textbooks that would keep a class teacher happy for a year", and was aware of the tensions arising if money was spent on the computer rather than on basic curriculum needs like textbooks. What was even more frustrating, he said, was the need to keep aside a certain amount of money each year to improve and extend the capabilities of the computer system. This, according to Mr. Johnson, would mean waiting about another three years before he could purchase the necessary hardware, for example, a disc drive.

According to Mr. Johnson, he anticipated the greatest use of the computer to be made in the department's administration, for example, for pupil records, examination marks, profiles etc., rather than in teaching.

He stated that he recognised that time was needed for individuals and educational organisations to produce and disseminate information and provide the necessary training of skills for the use of computers; and for teachers to look carefully to see what software material was appropriate for the teaching situation and to learn how to use the material effectively.

Mr. Joachim - Mr. Joachim said he regarded his head of department as a logical person and hence thought that computers would be to the head of department's interest, and also that he (the head of department) liked being on the "bandwagon". He said he believed that the only

pupils with whom the head of department would be using computers with was the top group because, according to Mr. Joachim, the head of department only taught the top groups.

Mr. Joachim remarked that time was a cost factor to be considered. He said he realised that one had to have priorities and that, at the moment, his list of priorities were set by examinations. At the time the interview was conducted, he said that teachers had only three free periods a week which, in his view, was "ludicrous... a total non-starter". Mr. Joachim said he believed that one way they had created time in the department was by introducing team teaching in the sixth form. This he said he felt however was much harder to do in the lower school.

Mr. Ridley - Mr. Ridley said that he was very aware that in order to acquire the skills necessary to be a successful computer user, he needed time, but that he had other more important things to do in his free time. As he admitted,

"Well all the time is like that, let's be honest. Yes, it's not right up in my priorities. My priorities, broadly speaking, are that this job really comes first in terms of time and everything. Then my MSc. at ..., and then my rugby refereeing which I take very seriously. Now after that, there isn't much time left".

A large proportion of his time was taken up with his Careers work and he said he felt a continuous tension between how much time should have been spent on teaching and how much time on his responsibilities as careers advisor.

Mrs. Malory - In Mrs. Malory's opinion, she felt that when Mr. Bohr organised the computer orientation course, they all went along as each department wanted to be seen to be involved. In her view however, she was very aware that she needed more training. Her problem, she said, was having sufficient time, given her present timetable commitments (23/25 periods a week) plus a fairly senior administrative responsibility. Mrs. Malory said she found it difficult to fit things into school time, but said that she was prepared to attend a course away from the school and out of school time.

She said she felt that it was the Headteacher's job to ensure that time was available for his staff to undertake the necessary training; to make sure that the curriculum offered the possibilities of the use of computers; to make certain timetable re-arrangements; and to make adaptations to the buildings where necessary for the use of computers in the school. In her view, if all these things were provided then she felt that teachers might be prepared to give the time needed to use computers in the school.

7.1.2.3 Strategies and Politics

Head of Department's Strategy (Mr. Johnson) - The head of department commented that his strategy was to start by looking for appropriate software - that which would fit in with what they were teaching. Some of these programs would be mainly data-handling programs for small group or individual work. He said he preferred to evaluate and analyse the programs himself and to see how they could be incorporated into their scheme of teaching. It would then be possible, he said, to draw up some draft proposals as to how the programs could be used and circulate these to his staff to be discussed in a couple of departmental meetings. According to Mr. Johnson, the next step would then be to make the computer available for those who were keen to try these programs out and hopefully, their interest would spread to other staff members as they saw their colleagues attempting to familiarise themselves with the computer.

The next stage of his strategy, he commented, would be to introduce a pilot scheme for one or two trial groups in the 3rd year. The 3rd year was chosen as he said he felt that these pupils would have already done a basic introduction to History, and that they were at an age where they could become "independent learners in so far as operating machinery". He admitted however that the year group chosen would inevitably be dictated by what materials were available. If the pilot scheme proved successful, he would then, in his view, formalise the use of the computer by introducing it into the syllabus of the following academic year.

At the same time, he indicated that the encouragement of staff was one of the most important factors in effectively introducing the use of computers. He said he believed that teachers should be encouraged to become familiar and confident in the proper use of computers. As he said,

"That I think is where you have to, for my money anyway, where you have to educate people the most - seeing the computer not as a frontline toy for the kids to play with, or even the staff to play with, but simply as another means of getting certain types of information.... Teachers in many instances are very private people. They don't like to be seen to fail publicly in the execution of a simple thing like this perishing program on Francis Drake to work".

Another way of achieving this, according to Mr. Johnson, was to send teachers to suitable courses, but had not himself sent any teachers because he said he felt that there had not been any relevant courses organised so far. He also commented of the idea of assigning members of staff to read suitable articles on using computers in their subject periodicals and to report back on the feasibility of introducing some of the ideas suggested into their syllabus.

He said he felt however that it was irresponsible to encourage the use of computers if adequate finance were not provided to purchase sufficient computers to make them a mainstream means of teaching. Finally, he indicated that he was aware of the danger of a lot of people jumping on the computer "bandwagon" and making the mistake of not using the computer appropriately and selectively as a teaching aid. As he remarked,

"I think when computers first came out on a broad scale for use in schools, everybody felt that it was like buying a filmstrip projector. You know, you just have to have one because that was the thing to do and if you can't find a computer application to your subject, you were a bit of a 'noddy'. So a lot of people jumped on the bandwagon and I think made mistakes".

Teachers' Reactions towards the Strategy - One of the teachers, Mr. Joachim, said that he strongly believed that before a computer was purchased for the department there should be, in the first place, prior discussion to see whether it was viable with respect to the costs involved as against other resources, and in the second place, a departmental commitment to its purchase. He said he felt that a suitable room should be allocated, pupils timetabled, training courses organised and the department as a whole encouraged to use it. In this way, the

individual teacher would be challenged to use it too. When his own department purchased a computer, he admitted that he had been unhappy that no proper consultation had taken place with other members of staff. He said he felt that it might have brought a back-lash to the department. As he commented,

"I think that the antagonism that you can cause by just taking that out and introducing 'hey, look what we have got' counteracts any good values that you might get, particularly at the moment when one is scratching around for chalk and paper and photocopying and we need new books for this and that and the other. And secondly, I think that there is the very democratic point that one should have a full discussion departmental wise... But with regards to computers, it was different. He didn't even tell. I found out about it outside the school".

Another teacher, Mr. Ridley, was of the opinion that there might be a negative effect if people were to just jump on the "computer bandwagon". He commented that he thought that this had already happened with the heads of departments deciding to buy computers because of the 50% subsidy, after having been convinced by the Headteacher in a meeting of departmental heads. He said he felt that some of the department heads did not consult their staff members and because the issue was not raised and debated, it was his view that there were strong ill-feelings within some of the departments at such a large single expenditure having been made. He stated that he had not been consulted with respect to the one purchased in his department, although he would have said yes to the purchase if he had been asked. According to Mr. Ridley, the issue was raised by the staff members in the department only after the computer had been bought. This, he admitted, was exceptional as they would normally discuss and debate any new issue or idea beforehand, for example, before the introduction of a new syllabus or the purchase of new textbooks. In this case, Mr. Ridley said he felt it was not raised by the head of department because, in his opinion, he (the head of department) feared opposition to its purchase and wanted to take advantage of the offer. The second reason Mr. Ridley commented was that he suspected that the head of department might have need of a computer since he was doing his PhD work. As Mr. Ridley remarked, "He's doing his PhD.... so that brings out immediate conflict. He needed it, I suspect".

Finally, Mrs. Malory admitted that she only knew about the purchase of the computer in her department "through the grapevine". According to her, the head of department had not

informed them as to where the money to purchase the computer had come from or informed them as to where the computer system was kept.

Thus, all three teachers interviewed commented at length about their reactions towards the strategy and policies of their head of department with respect to the introduction of the use of computers in their department. They said they felt that their head of department had not discussed the purchase of the computer with his staff members but had only informed his staff when it was purchased. It seemed also that he had not told his staff as to how he obtained the money to purchase the computer and where the computer was kept (some teachers said that he kept it at his home). There appeared to be a general "ill-feeling" on this issue as some of members of the department had indicated that they felt that proper consultation and discussion should have first been made, as was normally done for other major decisions of curriculum change, purchase of audio-visual aids, textbooks etc.

This one issue of the purchase of the computer without prior consultation seemed to have dominated their comments, and none of them mentioned any points as to how the head's specific strategy of introducing the use of computers in the department was working out. It might have been however, that they could not comment about it because they were un-informed as to what the strategy was in the first place as none of the teachers mentioned that they knew of a departmental strategy to the use of computers.

7.1.3 The Geography Department

7.1.3.1 An Overall View

Composition (Staff) - The Geography Department includes the teaching of both geography and geology. The department consists of seven members of staff, one of whom is a part-time teacher. Two members of staff are over forty years of age, two are in their thirties, and the other

three are in their twenties. There are two senior teachers in the department - one is the head of department and the other is the professional tutor and director of studies in the school.

Composition (Size) - During the '82/'83 academic year, there was about the same number of pupils taking Geography as there was taking History, making it also the second largest department for option subjects. There were approximately 20 pupils in the 6th form, 80 "O" levels, and approximately 100 "CSE" levels.

Teaching Practice & Support (Style) - Teaching was generally done in the traditional mode with chalk & talk. However, some of the teachers were open to using other types of resources including worksheets, audio and visual aids, and the occasional field trips.

Teaching Practice & Support (Administration) - The department met during the In-Service Training period allotted on Tuesdays in the school. This averaged to about one in three every Tuesday. During this time, issues concerning the department were raised by the members of staff which included administration, syllabus, pupil-related issues etc.

Teaching Practice & Support (Resources) - In terms of capitation, the Geography department was within the top middle range of departments. This capitation was mainly used for stationery (about 50%), the purchase of textbooks and maps, photocopying, and audio-visual aids (about 12%). The computer system was available in the department office and consisted of a BBC microcomputer (Model A) with a black & white monitor and a cassette recorder.

Impressions - The head of department seemed to be a very enthusiastic but dis-organised person (though this did not influence his teaching). On the contrary, most of the pupils got on well with him and as a result, he was able to communicate well especially with low-ability pupils.

Relationships within the department were friendly. One gained the impression however, that the head of department did not seem to give a strong lead in providing professional guidance,

and so things were done or not done depending on the personal interest of the individual teacher.

There was a department "office" where the head of department's desk was situated and where coffee was available for staff members. One would frequently see about two or three teachers, at any on time, in the department office involved in regular conversations. The atmosphere in the office was busy but light-hearted.

There was also the resource room next to it where teaching resources (for example, worksheets, textbooks, audio visual aids etc.) were kept on shelves and in cabinets. It seemed that there was no departmental effort to coordinate teaching aids and resources for example, and hence there were some frustration amongst some of the staff when they were unable to find the worksheets that they were looking for because of the dis-organised nature of the room.

7.1.3.2 Teachers' Organisational Profiles

Mr. Coleridge (Head of Department) - Mr. Coleridge said he recognised that even though there was a tendency for teachers in the department not to use the computers, he felt that they were beginning to show more interest in them.

With respect to the use of computers in his class, Mr. Coleridge said he believed that a lot of the pupils were not able to use computers. This, he commented, posed a class organisation problem which he said he felt could be reduced by sub-dividing the class into smaller groups and assigning a pupil who has had previous experience with a computer to each of these small groups. In his opinion, he felt that this was a rapidly declining problem as more and more pupils were learning how to use computers either at home or in school.

The other problem Mr. Coleridge said he perceived was with disruptive groups of pupils who he feared would damage the computers while using them. A preventive measure that Mr.

Coleridge said he had adopted would be to only allow one pupil at a time to use the computer under strict surveillance.

According to Mr. Coleridge, he had used the computer much less than he wanted to in his own personal teaching because he felt that he did not have the time to develop relevant software or programs for his teaching.

Miss. Constance - Miss Constance said she saw the department's computer database as a useful resource where up-to-date data could be accessed by staff members so that one could, for example, obtain the necessary information of the population of a particular country or its Gross National Product (GNP).

She mentioned that she was able to attend only a few sessions of the lunchtime course organised by Mr. Bohr because other activities had begun to impose upon her. This reflected the continuous tension that she said she felt in wanting to keep her lunchtimes free, and she admitted that she did get to a point where she valued her free time and the opportunity to be away from children to relax, and so lunchtimes became very precious to her. If she had to do something in this period however, she said she would have preferred to use it for pupils rather than for computers. As she remarked,

"I'm afraid I get to a stage where I jealously guard my lunchtimes. It's the only break you get from children all day really. Break is not long enough and there are times when I have to just crash out somewhere or I have got a child to see, or a child to keep in, or I've got a member of staff to see. And so its very rushed".

Mr. Hugo - In the administrative work in the school, Mr. Hugo said he could see the advantage of storing the information on a computer but would only use it on one proviso - that he could get at the information rapidly when he wanted it, often at a moment's notice otherwise he felt that it would be easier to look it up in a book. As he commented,

"...you've got to spend time on looking for the right tape, making sure that the tape is in the right position. By the time you got all this business, you've spent a lot of time on unnecessary preparation, to my mind, it is unnecessary. If it is instant, and I haven't got to worry about some other thing, then yes... But then perhaps I'm asking too much on that basis".

In Mr. Hugo's opinion, there was also the question of efficiency. Mr. Hugo said he felt that more time was taken up in preparing than in actually using or operating the computer, and that it would be quicker, in the long run, to do the job manually.

7.1.3.3 Strategies and Politics

Head of Department's Strategy - Mr. Coleridge said that his strategy to introduce computers in his department was to start with an internal in-service training course. This would involve borrowing two or three computers from the other departments. He said he wanted to begin with a "gentle" course in simple programming that would, as he himself remarked, "....allow(ing) people to go ahead if they want to and do it more quickly. Introducing just simple programming, ever so simple programming, just so that they are not left behind by the machine, that's all".

In his opinion, this should then be followed up by demonstrating the practical uses of the computer in the classroom. For example, he said he would like to use computer simulations to demonstrate the use of a single computer in a classroom, or possibly, with pupils assigned to the computer in another room, one pair at a time. This he said would be mainly for the younger pupils (i.e. under 16). According to the head of department, he felt that it would be helpful to start with a bank of suitable software, although he perceived that there was a shortage of good educational software that would run on the BBC computer.

In the short term, Mr. Coleridge said he would like to see the use of computers for simple mathematical calculations in Geography simulations. He said he would then want to extend its use to wordprocessing facilities for teachers so that handouts could be improved and updated easily by them. In the long term, he said he would want to use the computer in an administrative capacity, for example, to keep a track of the resources available in the department.

Mr. Coleridge stated that he did not intend to make it compulsory for teachers to use the computer in the department, but to allow teachers to go ahead using CAL if they wanted to. He said he was also aware that, in the final analysis, teachers were the ones to make professional decisions about the best way to teach a particular child, although he admitted that a lot of these decisions were made instinctively. He thus mentioned that he had consulted with the rest of his staff before the purchase of the computer (either individually or at department meetings) and realised that there was, as he said,

"...a range of views from the quite enthusiastic who can see certain values to it, to people who are not sure whether it's better to spend that money on textbooks or this. They are not opposed to it but there is a shortage in that area and they may consider that more important."

This also meant, according to Mr. Coleridge, that he was cautious that schools should not go into the use of computers in a "big way" too quickly.

Teachers' Reactions towards the Strategy - One of the teachers interviewed, Miss Constance, said she was frustrated that too much emphasis had been placed on whether a department had got a computer or not, and not as to whether it was fulfilling its duty to educate its pupils properly. As she said, "I feel there is too much...value is placed on a department whereby it has got a computer or not which I think is ridiculous because if you are not educating children, your department has no value anyway".

She said she believed that if the department was "go-ahead", then it would be natural for the department to use computers. In her opinion, she considered that there were some traditional geographers in the department and feared that it would be difficult for them to use computers in their teaching, and that she would not be the one to force them to.

Mr. Hugo's indirect criticism was that too much money had been spent on the purchase of computers when there was not sufficient finance available to purchase basic textbooks, atlases etc. According to him, he believed that some teachers felt that the money spent could have been used wisely on other resources.

7.1.4 The Mathematics Department

7.1.4.1 An Overall View

Composition (Staff) - There were nine members of staff in the department. Out of the nine, two were senior teachers, one being the head of department and a senior master, and the other being the examinations officer. Four of the teachers were above mid-forties, two in their mid-thirties, and the rest under thirty years of age.

Composition (Size) - It was compulsory for all pupils to do English and Mathematics throughout their first 4 years in the school (i.e. 2nd to 5th year). Hence the Mathematics department had the largest number of pupils taking their subject (equal to that of the English department) in the school. The number of pupils during the '82/'83 academic year was about 300 pupils for each year (up to 5th year).

Teaching Practice & Support (Style) - Teaching was done in the traditional mode with the use of chalk and the blackboard, the use of the overhead projector, and a heavy reliance on worksheets (produced on banda).

Teaching Practice & Support (Administration) - This was mainly carried out during the In-Service Training sessions held every once in three weeks on a Tuesday. Administrative issues including the updating of information (e.g. pupil lists etc.), problems with children, syllabus etc. were discussed.

Teaching Practice & Support (Resources) - In terms of capitation, the Mathematics department was within the top range, simply because it had one of the largest number of pupils in the school. Most of the capitation was used for stationery, the purchase of textbooks, and paying the cost for photo- and banda-copying.

The Mathematics department had purchased twelve hand-held SHARP microcomputers for class work. They had also purchased a BBC microcomputer (Model A), but it seemed that most of the teachers interviewed in the department were not aware as to where the BBC computer was kept.

Impressions - The head of department seemed to be frequently unavailable (or appeared to give that impression). Pupils (and staff) regarded him as a good and competent teacher, but there had been some complaints by the pupils that he sometimes was not present in class to teach because of other school administrative commitments (he is one of the senior masters of the school). Among other things, he was responsible for the sorting out of cover teaching which was a responsibility that was not really appreciated by or popular with members of staff, especially when they were the ones appointed to do the cover. He also assisted the Headteacher in the planning of the school timetable.

The head of department also gave the initial impression that he was a very strict and "cold" person. To the pupils, he definitely appeared so and one cannot help but think that it was his strategy to handle the pupils in the school in this manner. Amongst the teachers, one had the same impression about him. A few of his closer colleagues commented however that this was only a front and that he was a warm person if one was able or allowed to go below the initial "coldness".

It seemed that most of the members of staff accepted the way the department was run as a matter of fact. They did not make many comments and did not choose to overtly question decisions that were made by the head of department. They also seemed to work independently

without much support from each other in the teaching of their subject. This may have been as a result of a lack of direct guidance and support from the head of department.

Some of teachers in the department seemed very set in their ways of teaching, and not prepared to change their way of teaching unless compelled to do so by way of a departmental policy. For example, some of them changed their method of teaching only when the department decided to switch from traditional mathematics to SMP mathematics.

7.1.4.2 Teachers' Organisational Profiles

Mr. Novalis was not available to be interviewed but was finally persuaded, as head of department, to complete a short questionnaire regarding his strategy of introducing computers into his department. Two of the other three teachers that were interviewed in the department (Mrs. Jackson and Miss. Sully) did not have much to comment because, according to them, they did not have much experience in using computers and thus were not able to identify organisational factors that would affect their use of computers.

Mr. Joule - According to Mr. Joule, there was a series of related considerations in the use of computers in the school. Firstly, he said he believed that there should be a batch of computers available within the department itself so that any child could turn to one when needed, just like a pocket calculator. Having only one computer in an entire department was, as he complained, "good to play with but totally useless for teaching". Secondly, he said he recognised the financial restrictions and the difficulties of purchasing such a number of computers. As such, he said he believed that, as money was short, the department's present priority should be to improve the existing limited resources.

Although the department was intending to introduce a mini-course in computers using the SHARP computers they had purchased, Mr. Joule said he believed that it had not yet come about because there was no one willing to prepare the material. That person, according to Mr.

Joule, would probably have to be himself. In Mr. Joule's view, he would not use computers until he was able to find the time to become more familiar with them. He said he felt however that even if he was given the opportunity to use them, there would not be enough time to explore the computers' true potential, or to fit them in his teaching, due to the normal heavy teaching workload. As such, in his opinion, the use of computers were a long way down his list of priorities when it came to the use of aids.

With regards to the use of the SHARP computers in the department, Mr. Joule said he felt that the intention was to use them for the 3rd years at the end of the summer term, as that was the time when he said he felt the pressure was off, due to the 5th formers having left the school. As he said, "....and there is a fairly sort of holiday atmosphere, you know, we're unwinding towards the end of term".

Mrs. Jackson - Mrs. Jackson said she regarded learning a new teaching method as taking a lot of time which she felt she could ill-afford. If, according to her, she were to use the computer in her teaching, she would use it during the "easy spell" that was towards the end of term when, she said she believed, things were more relaxed (and when, acoording to her, the pupils did not want to work). Workload on pupils and teachers was, according to Mrs. Jackson, dependent on the year group and not constant throughout the year (usually the workload was more relaxed at the end of term when coursework, for example, was not "crammed in").

Miss. Sully - Miss Sully said she had no knowledge at all about using computers in teaching, and hence had no knowledge of the likely constraints or organisational problems that would be encountered in using computers in the department. She also did not have any related comments to make about the management of the department.

7.1.4.3 Strategies and Politics

Head of Department's Strategy - The head of department refused to be interviewed throughout the three years the case study was conducted. The main reason given was that he was "too busy". Eventually, he was persuaded to fill in a short questionnaire designed specifically for him (Appendix N). He however answered the questionnaire very briefly. What follows is a summary of the answers provided by the head of department to the questionnaire that was given to him.

According to Mr. Novalis, the twelve portable SHARP computers were intended to be used as a means of introducing basic programming and computer awareness to all third year pupils. The teacher who he selected to conduct the course however left for another teaching post overseas and so plans to use the computers, remarked Mr. Novalis, had to be shelved.

According to Mr. Novalis, the decision to purchase the BBC computer (Model A) was made six months later. His strategy was to use the BBC computer mainly for the recording of group and examination assessment, and for administration (for example, the production of examination papers). The first pre-requisite, in the head of department's mind, was the availability of appropriate staff expertise in the use of computers.

When asked in the questionniare as to the reaction of his staff to the purchase of the computer and what his plans were to encourage his staff members to use the computer, his reply was that those who were knowledgeable about computers were favourable to the decision, and that his plans to encourage his staff members to use the computers were "under discussion".

Teachers' Reactions towards the Strategy - Some of the teachers were not sure as to the decisions made with regards to the use of the SHARP computers in the department. Teachers said they believed that the use of the SHARP computers never did get off the ground because there was no one willing to prepare the material or courseware necessary for the computer awareness course.

With regards to the purchase of the BBC computer, some teachers said they were only informed about it after the computer was purchased. According to them, there was no formal prior consultation made with staff members by the head of department. One of the teachers, Mrs. Jackson, however said she felt that the members of staff in her department would normally not take offence if their department head did not inform them of decisions made by him. Thus when the BBC computer had been purchased out of the department's capitation without their prior knowledge, she said she felt that it was justified as it was a field that Mrs. Jackson felt her head of department was more familiar with. Another teacher however said she felt that, because of financial restrictions, the department's present priority should be to improve the present limited resources and not to purchase computers.

7.1.5 The Business Studies Department

7.1.5.1 An Overall View

Composition (Staff) - The Business Studies department consists of three smaller sections, i.e. the Economics, Commerce (Typing and Short-hand) and Sociology sections. There are only three full-time members of staff in the department, each in a different section, with each of them being a subject specialist in their own right. In addition, there are two part-time members of staff, one for Commerce and the other for Sociology. All of them were in their early forties, except for the full-time commerce teacher who was in her mid-twenties. The Economics teacher is also the head of department.

Composition (Size) - During the '82/'83 academic year, the number of pupils in the Business Studies section were twenty-five in the 6th form, and fifty in the 4th and 5th years. In the Sociology section, the number of pupils in the 6th form were thirty-five, and in the 4th and 5th years, twenty. In the Economics section, the number of pupils in the 6th form were twenty-one, and in the 4th and 5th years, about thirty.

Teaching Practice & Support (Style) - Teaching varied from each section to section. In the Sociology section there was more discussion; in Commerce, more practical work; with Economics lying in-between these two teaching styles.

Teaching Practice & Support (Administration) - The individual sections would meet informally on a regular basis to discuss general issues related to the department. This was normally done during the allotted In-Service Training periods, once every three Tuesdays.

Teaching Practice & Support (Resources) - In terms of capitation, the Business Studies department was within the bottom of the middle range. This department was the lowest of the five departments chosen in the sample. The capitation received was shared within the three sections with a central fund for common purchases and needs. The three sections obtain different proportions of the capitation depending on the size and nature of expenses that would be incurred unique to each of these sections. The central fund or pool was used mainly for the purchase of stationery and exercise books.

The department had purchased a BBC microcomputer (Model A) but because no one knew how to use the computer, it was temporarily "on loan" to the Computer Studies department. This would be until a member of staff in the Business Studies department could learn how to use the computer and thus use it within the department.

Impressions - Each of the sections ran very independently and could be seen, to all practical points and purposes, to be separate departments with different syllabii, different combinations of students and methods of teaching. As each of the teachers were subject specialists, there was a respect for how each looked after their own sections. The department head did not seem to interfere much with the workings of each section. His involvement was mainly in the

form of support to the different sections, especially with respect to the provision of adequate resources.

7.1.5.2 Teachers' Organisational Profiles

Mr. Rubens (Head of Department) said he wanted to attend the lunchtime orientation courses but was unable to do so as he was on lunchtime duty on the same day of the week. He said he did however borrow a computer to take home so as to become more familiar with what it could do, but was only able to work through the initial "Welcome" program.

7.1.5.3 Head of Department's Strategy

The head of department (Mr. Rubens) said he did not have any specific strategy as the decision to purchase the computer had been made at short notice - the school had an additional computer to be sold to one of the departments and he was asked whether he wanted it (as he had just recently been on a one-day computer course). Since, he said, he thought this was a golden opportunity, he accepted it. He stated that he soon became frustrated as he did not find the time to learn how to use the computer or any specific teaching application for it. Instead of letting it be idle, the head of department said that he decided to loan the computer to the Computer Studies department.

Mr. Rubens had however some after-thoughts as to how he would want to use the computer. According to him, he would initially like to start with the 6th form in Economics for data collection, interrogation and representation (for example, representing the data in the form of graphs). He said he saw programming as a second priority. In the long term, he said he would like to use the computer for Commerce in a computer awareness course with wordprocessing specifically in mind. He said he perceived that the teacher in-charge of commerce was keen to use a computer but had not held detailed discussions with her. In his view, he saw the computer as being used in the 6th form and not in the lower school as he believed that the class sizes in the lower school

was too big. In the mean-time, he said he was waiting for the opportunity to discuss with Mr.Bohr or Mr. Johnson as to how he could start building up a source bank of information and CAL schemes.

7.2 CONCLUSION

Although the Business Studies Department had only one teacher interviewed (i.e. the head of department), it was felt that it would provide an additional insight to the use of computers in a department and in a school.

7.2.1 Strategies and Politics

The categories provided by White and Lippitt (1968) on leader behaviour and member reaction in three different social climates of a youth club (in terms of autocratic, democratic and laissez-faire), provide a useful means of describing the leadership styles of the heads of the five departments and the way in which the heads of departments negotiated (or not negotiated as the case might be) with their staff members with respect to the purchase of computers in the departments. These leadership styles are then taken into account when discussing the reactions of the teachers toward their head of department, and toward their head of department's strategy to introducing computers into the department.

7.2.1.1 The Science Department

This department was seen to be a "democratic" department as any decisions made, with respect to the purchase of the computer and its intended use, were generally made with prior consultation and with the general consent of the other staff members in the department. This was then actively encouraged and assisted by the head of department, and members of staff were encouraged to work with whomever they chose to become more familiar with the use of the computer.

There was mutual respect shown between staff members of the Science department especially between the senior staff members within the department. As such, decisions made by them were generally accepted by others and support given to carry out those decisions to the best of their capabilities. This may be also attributed to the fact that there were three departments within the Science department, and so the Head of Science had to play a more "coordinating" role.

7.2.1.2 The History Department

The History department, as compared to the Science department, could be seen to have an "autocratic" leadership with respect to the decisions made for the purchase of the computer in the department. What was noticed was that the head of department had some clear reasons as to why he decided to purchase the computer, without prior consultation, and that he was aware that there would be opposition to this decision. Moreover, he saw it as "his job" to make certain decisions of this nature, especially when it had to do with new innovative forms of teaching.

There seemed to be some form of antagonism towards the head of History as a result of his kind of leadership style. Various reasons were given by the staff members as to why their head of department had purchased the computer - all of which had to do mainly with the personal gains of the head of department. The discontent created was open and hostile. All three of the staff members remarked that the decision to purchase the computer was made by the head of department alone and that they were not informed at all.

7.2.1.3 The Geography Department

The Geography department leadership could be considered to be "laissez-faire" because there was complete freedom (amounting to a "free for all" attitude) for individual teachers to use the computer in whatever way they want, or for them not to use the computer. Some teachers in the department were reported to be frustrated, as in other areas of teaching in the department, as

there was no clear guidance and support; and one got the impression that the department was less organised (for example, with respect to where the resources and teaching aids were kept). Unlike the defined "laissez-faire" department (by White and Lippitt), the head of the Geography department was keen to positively help any of the teachers who might want to use the computer because of his own enthusiasm about computers.

Although some teachers said they were not too pleased with the decision to go ahead with the purchase of computers in the Geography department, there was a quiet acceptance of it. One teacher in the Geography department said she was frustrated that not all of the teachers were "pulling in the same direction" and that there was no one willing to take a lead. She was also the one that said she felt that too much emphasis was placed by the school on whether it had computers or not. She eventually left the school when the opportunity came to teach the same subject in another school.

7.2.1.4 The Mathematics Department

With respect to the decisions made for the purchase of computers in the Mathematics department, the leadership style also seemed to be "autocratic", as decisions were made without prior consultation or knowledge of the majority of the teachers. Most of the teachers did not know of the actual plans of the head of department in the use of the computers, nor were they informed of the "state of play" with respect to its use.

With the Mathematics department, the discontent created, unlike the History department, appeared to be kept below the surface where the atmosphere was more damped and sobered. There was also the general attitude that some of the teachers were not prepared to change in their way of teaching unless compelled to do so.

7.2.1.5 The Business Studies Department

The leadership style of the head of the Business Studies department was seen to be "democratic". He allowed his members of staff to pursue the use of computers according to their own interests. He was however willing to extend any help that he was able to provide, although it might have been very limited as his own knowledge of computers was minimal.

7.2.1.6 Summary

All three types of leadership styles, i.e. democratic, autocratic and laissez-faire, were seen in the five departments. This is represented in the Figure 7.1, which shows the leadership styles of the heads of departments (as perceived by the teachers) toward the use or non-use of computers.

S/no.	Department	Leadership Style
1.	Science	Democratic (towards computer use)
2.	History	Autocratic (towards computer use)
3.	Geography	Laissez-faire (whether it is towards computer use or non-use is dependent on the individual teacher to accept or reject the offer of help)
4.	Mathematics	Autocratic (against computer use)
5.	Business Studies	Democratic (towards computer use)

Figure 7.1 Leadership Styles of the Heads of Departments

7.2.2 Organisational Constraints and Solutions

A summary of the organisational problems encountered and solutions envisaged by these teachers and the heads of departments in introducing the use of computers into their departments is provided below and represented in Figure 7.2. Due to the large number of comments by teachers on the factor of "Time", this is summarised in a separate figure (Figure 7.3).

7.2.2.1 The Science Department

Teachers in the department perceived organisational constraints in the areas of class size and level, use, resources and time. Some of them were able to mention a few solutions, either personal or organisational ones, to these problems, while others mentioned solutions alone without formulating their problems. These problems and solutions included :

1. **Class Size and Level** - Teachers mentioned that they would have preferred to start using computers at the 6th form level as they consisted of smaller class sizes. They said they also believed that the pupils in the 6th form generally responded more readily. In addition, the head of department said he felt that there were more difficult science concepts to be taught in the 6th form level which he perceived could be handled by the use of a computer.

2. **Use** - Teachers commented that they felt unsure as to how portable computers were and how that would in-turn affect the way they were used.

3. **Resources** - Teachers remarked that they perceived that there were insufficient facilities provided for the use of computers. One teacher said she experienced an initial frustration when she tried to use the department's computer and discovered that the room where it was in was cold, and that there was not a suitable power point nearby. Another teacher however said he

was able to use the computers in the computer studies room readily as his own class was next to it and because he related well with the head of Computer Studies.

4. **Time** - Teachers stated they felt frustrated that there was a lack of time to find out more about computers and to see how they could be used in the classroom. Two of them (one of them being Mr. Bohr) said they felt that there was no time given or timetabled to help and advise other members of staff in the use of computers. Teachers also commented that there was no time because of the varying pressure of work and responsibilites.

The head of department commented that time was the "critical factor" and said he felt that he did not "make time" to use computers because they were not his first priority. He said he believed however that if he was more efficient, he would be able to "create" some time to be devoted to computers. In his view, he felt that there might be more time available in the summer term when the state examinations were over. He said he also realised that software should be purchased rather than written by in-experienced teachers as they would take to much time to do so because of their lack of experience.

7.2.2.2 The History Department

One overwhelming factor was mentioned by the teachers in the History department. This was the constraint of **Time**. Teachers mentioned that time was needed for them to know and to acquire the skills necessary to use the computers, and that there was no time provided for training although there was a willingness to attend such training courses.

Teachers also said that they felt that there was a continuous tension between having sufficient time for their administrative responsibilities and having sufficient time for teaching. One teacher commented that the provision of only three free periods a week was "ludicrous" as it did not give them the time to execute other responsibilities.

Teachers said they realised that the time allotted for the use of computers was a matter of priorities which, for one of them, was not high enough a priority, and for another, was dictated by examinations.

The head of department mentioned the fact that time was needed for teachers to carefully look at software to see whether these software were appropriate, and that time was needed for individuals and organisations to produce and disseminate computer information and skills.

Teachers said they felt that they would be prepared to use computers if the Headteacher ensured that time was available for staff to undertake the necessary training, made sure that the curriculum offered the use of computers, and made the necessary adaptations to school buildings so that computers could be used. Another teacher said he believed that time could be "created" by team-teaching as was practised by the department. This, he admitted, would be more difficult to incorporate in the lower school.

7.2.2.3 The Geography Department

Teachers in the Geography department perceived constraints in two main areas :

1. **Class size and level** - Teachers said they saw the use of computers as very limited, i.e. that computers were for 6th formers only.

Another problem which teachers were worried about was noted by the head of department when he mentioned that his pupils were not computer literate (i.e. they did not know how to use computers) and that some of them might be disruptive. As such, he said he believed that pupils should work in small groups with a pupil who knew about computers; or that pupils should work one at a time so as to avoid the possibility of computers being damaged by them.

2. **Time** - This mainly had to do with time for training, teaching and the development of software.

Teachers said they felt that there was insufficient time to attend the lunchtime orientation courses, and that there was a continuous tension of wanting to keep lunchtimes free. They said they also believed that more time would be taken up in preparation to use computers than actually using them. One of them remarked that he would only use computers if the information from the computer would be immediately available at a moment's notice.

The head of department commented that he did not use computers as much as he wanted as he said he did not have the time to develop the relevant software for use in his teaching.

7.2.2.4 The Mathematics Department

The two main factors that were mentioned by the teachers in the Mathematics department were:

1. **Resources** - Teachers remarked that to have one computer in the department was only good to play with but useless for teaching, and felt that it would be seen as a toy and not relevant to any important work. They suggested having a batch of computers available within each department so that they could be used whenever needed, just like calculators.

2. **Time** - Teachers mentioned that time was needed to become familiar with computers and to learn how to use them in their teaching, but that it was time they could ill-afford. They said they recognised that the use of computers was low in their priorities. Furthermore, they said they felt that the present teaching workload was very heavy, but said they felt that the best time to use computers in their teaching might be during the "easy spell", i.e. at the end of term especially the summer term when, according to them, the pressure of work was less.

DEPARTMENTS AND COMPUTERS (ORGANISATIONAL FACTORS) :

S/NO TEACHER	STRATEGIES	REACTIONS	CLASS SIZE & LEVEL	USE	RESOURCES
SCIENCE DEPARTMENT					
1. June			* Groups not small enough. * Start with 6th form because easier ie. they respond, and smaller class size.	* Unsure how portable comps. are and how that would affect use.	* Insufficient facilities. * Initial frustration because room where comp. was in was cold and no power point.
2. Mikado					* Able to use comp. room because his class is next to it, and he is in good terms with Mr. Bohr.
3. Bohr	NM				
4. Cano (Head)	* Introduce in a "quiet" way. * Pilot study with one class. * A back-up to 6th form lessons. * Would like to know more about potential of comps. so that he would feel more certain when allocating finance. * Dept. should provide expertise - advise, help & trg. * Aware that he should not be seen "hogging" the comp.		* Starting with 6th form as more difficult science concepts at this level.		
HISTORY DEPARTMENT					
5. Joachim		* No prior discussion - not democratic and antagonism caused. * Head of dept. is logical but likes bandwagon and will use comps. because he only teaches top grps. * Should first obtain dept. commitment.			
6. Ridley		* Negative effect if dept. heads jump on "comp. bandwagon". * No prior consultation made. * Dept. head was doing PhD work which reqd. comp.			
7. Malory		* Only heard about purchase of comp. through the "grapevine". * Teachers went along orientation course as each dept. wanted to be seen to be involved.			
8. Johnson (Head)	* Fully aware that money used could have been spent on books to keep teachers happy. * Look for appropriate software and draft proposals. * Introduce a pilot scheme for 3rd years. * Encourage staff.				

Figure 7.2

DEPARTMENTS AND COMPUTERS (ORGANISATIONAL FACTORS) :

S/NO TEACHER	STRATEGIES	REACTIONS	CLASS SIZE & LEVEL	USE	RESOURCES
GEOGRAPHY DEPARTMENT					
9. Constance		* Too much emphasis placed on whether dept. has got a comp. * Traditional teachers in department. (If dept. is "go-ahead", it would be natural for depts. to use computers.			
10. Hugo		* Too much money spent on comps.	* Used in a limited way because only for 6th form.		
11. Coleridge (Head)	*Start with in-service course. * Demonstrate practical uses. *Short term - simul. Medium - wordpro. Long term - admin.		* Pupils not literate in using computers. (Pupils to work in small groups with a computer-literate pupil). * Disruptive pupils. (One pupil per comp at a time).		
MATHEMATICS DEPARTMENT					
12. Joule		* Dept.'s present priority should be on improving limited resources because of financial restrictions. * No teacher was willing to prepare material or courseware for computer literacy course.		* Only one comp per dept. is "good to play with but useless for teaching". (A batch of comps. within each dept., just like calculators would be useful).	
13. Jackson		* Did not take offence when head of dept. did not consult staff before purchasing computers.			
14. Sully	NM				
15. Novalis (Head)	*Start with comp. awareness course for 3rd years. *For admin. eg. production of exam. papers and assessment.				
BUSINESS STUDIES DEPARTMENT					
16. Rubens (Head)	*No specific strategy but allowed staff to pursue their own comp. interest.		*Only used for 6th form as class sizes for them is small.		

Figure 7.2 (contd.)

DEPARTMENTS AND COMPUTERS (TIME) :

S/NO TEACHER	TRAINING	TEACHING	DEV. SOFTWARE	OTHERS	PRIORITY
SCIENCE DEPARTMENT					
1. June	* Frustrated because of the lack of time to find out more about comps. and how they can be used in the classroom.	* Varying pressure of work.			
2. Mikado		* No time due to pressure of work and responsibilites.	* No time to develop suitable software.	* No time to help other staff in comps.	
3. Bohr				* No time timetabled to discharge his responsibilities to advice indv. teachers.	
4. Cano (Head)	* No time to develop his own knowledge and experience in using computers. * Being more efficient may "create" time.	* More time in summer term when national exams. are over.	* Software should be purchased rather than written by inexperd. teachers.		* Time is the critical factor. * Does not "make time" because comps. are not his first priority.
HISTORY DEPARTMENT					
5. Joachim		* Only 3 free periods a week is "ludicrous". * Create time by team-teaching (more difficult in lower school).			* Time is a cost factor. * List of priorities is dictated by exams.
6. Ridley	* Time needed to acquire skills to use comp.	* Continuous tension between teaching & careers work.			* Priority to use comps. not high enough.
7. Malory	* No time for training though prepared to attend courses.	* No time because of administrative responsibilities.			* Feels that it is the Headteacher's job to ensure that time is available for staff to undertake necessary trg.; to make sure that curriculum offers the use of comps.; to make the necessary adaptations to buildings to use computers. Teachers may then be prepared to give time.
8. Johnson (Head)	* Time needed for teachers to learn how to use comps.		* Time needed for teachers to look carefully at software to see whether it is appropriate. * Time needed for individuals and orgs. to produce and disseminate info. and skills.		

Figure 7.3

DEPARTMENTS AND COMPUTERS (TIME) :

S/NO TEACHER	TRAINING	TEACHING	DEV. SOFTWARE	OTHERS	PRIORITY
GEOGRAPHY DEPARTMENT					
9. Constance	* No time to attend lunchtime orientation courses.	* Continuous tension of wanting to keep lunchtimes free.			
10. Hugo		* Would use only if information is available at moment's notice. * More time taken up in preparation than in using comp.			
11. Coleridge (Head)			* No time to develop relevant software and so uses comp. less than what he wants.		
MATHEMATICS DEPARTMENT					
12. Joule	* To become familiar with compe.	* Normal teaching workload is heavy (Use comps at summer term because pressure of work is less then).			* Priority is low.
13. Jackson	* Learning to use comps. to teach maths. takes a lot of time which she cannot afford.	* Would use comp. during "easy-spell" ie. at end of term.			
14. Sully	NM				
15. Novalis (Head)	NM				
BUSINESS STUDIES DEPARTMENT					
16. Rubens (Head)	*Unable to attend orientation course because of other lunchtime responsibilities.				

Figure 7.3 (contd.)

7.2.2.5 The Business Studies Department

The head of department's perceptions of the main organisational constraints were those of class size and level, and time. As with the other teachers, he said he realised that computers could only be used for the 6th form as the class sizes at that level were sufficiently small. With respect to time, he said he felt that, due to other lunchtime responisibilities, there were insufficient time to attend the computer awareness course by Mr. Bohr.

7.2.2.6 Summary

On the whole, the overall view of the Science, Geography, Mathematics and Business Studies Departments towards the organisational factors of using computers within the departments were mainly constraint factors (-). The main organisational factors and overall view for each of the departments are represented in Figures 7.4 and 7.5.

Dept.	Training	Teaching	Dev. of Softw.	Priority	Others
Science	/	/	/	/	/
History	/	/	/	/	
Geography	/	/	/		
Mathematics	/	/		/	
Business Studies	/				

Figure 7.4 Overall View of the Organisational Constraint of Time

Dept	Time	Class Size & Level	Resources	Overall View
Science	/	/	/	-
History	/			-
Geography	/	/		-
Mathematics	/		/	-
Business Studies	/	/		-

Figure 7.5 Overall View of the Main Department Organisational Factors

CHAPTER 8 : THE SCHOOL AND COMPUTERS

8.0 INTRODUCTION

In any analysis, it is important to realise that teachers are organisationally and socially grouped into departments and that these departments are structured within the framework of the school. Hence, any form of implementation needs to be examined not only at the level of the individual teachers but also at the level of the school as a whole, i.e. looking at the teachers' view of the school, the interactions of the different departments in the school, and the factors that bear on the school from outside influences.

This chapter is thus a continuation of the previous chapter in that it looks at the different factors that influence the introduction of computers, but this time at the level of the school. It begins with the perceptions of the teachers towards the organisational constraints and solutions at the school level. The strategy of the Headteacher towards the introduction of computers into the school, and the reactions of the teachers toward the strategy and policy of the Headteacher are then analysed. These factors, as described by the teachers, are summarised in Figure 8.1.

We chose not to go beyond the level of the school as our interest was on what was happening within the school. As a result, the influences outside of the school were not studied in any detail, although one was aware of their importance within the overall context of the implementation of computers in a school. Eleven of the fifteen teachers did mention some of these "outside" influences, i.e. at the educational level. These "outside" influences are covered in Section 8.4 where a description of the factors that some teachers felt were important are analysed. A summary of these comments are outlined in Figure 8.2.

8.1 TEACHERS' ORGANISATIONAL CONSTRAINTS AND SOLUTIONS (SCHOOL LEVEL)

The teachers perceived six main factors that would affect or influence the use of computers in the school. These factors were :

1. **Training.** Teachers mentioned the need to be trained if computers were to be used in the school.

(a). **In-Service Training.** Training on the use, awareness and information about computers was considered a high priority by the teachers. They said that an on-going staff training programme should be provided regularly, preferably by teachers in the school. They also said they felt that such a training programme should not just be in computer programming but on the uses of computers for each subject as well. One teacher also suggested, for example, a three-day course in programming and in the evaluation/testing of software, while another teacher said she would prefer a week-long orientation course. Yet another teacher suggested that a trial lesson be carried out to discover the likely problems and preparation needed in using computers.

(b). **Demonstration of/and Actual Use of Computers.** Teachers said they believed that there was a need to provide actual opportunities to use computers and to learn how to apply them both to individual teaching and for use within the department. Organising various events which demonstrated the different uses and applications of computers, according to them, was good but insufficient.

(c). **Orientation Courses.** The orientation course given by Mr. Bohr was seen to be helpful, but some teachers said they felt that one hour a week was not sufficient. In their opinion, once they had missed a session, it was difficult to resume the course as there was insufficient incentive to carry on even though, according to them, they had found it beneficial.

(d). **Nomination for Attending Courses.** Some teachers said they perceived that it would be more difficult to justify going on a computer course if they were not Computer Studies teachers. This was, according to them, especially so when finances were limited and when teachers had to be nominated by senior staff before being able to attend such training courses. As one teacher commented, "....you'ld have to be suggested rather than you suggest it... so it's a bit difficult if you want to go".

2. **Finance/Resources.**

(a). **Provision of Resources.** Teachers said they believed that it was the responsibility of the school to provide the necessary support, especially in terms of available facilities, for the use of computers in the school.

(b). Finance. Teachers said they perceived the problem of not having adequate finance to provide sufficient numbers of computers. They said they realised that any finance available (for example, to buy a computer network system) would be in competition with other school needs, like the purchase of a new school minibus.

(c). **Insufficient Classroom Space.** In the teachers' opinion, there was insufficient classroom space and desks, let alone computers. They also considered that there would be physical difficulties in moving classes or computers to enable the use of computers in their teaching.

(d). **Requirements for the Storage of Computers.** Questions were raised by the teachers about the conditions of storage of computers, for example, dust, damp or chemically free environments. They were unsure of the requirements needed for a computer room. One teacher, for example, also said he felt that keeping the computer in a cupboard and taking it in and out when needed would be a "hassle".

(e). **Technical Assistance.** It was regarded as important by teachers for there to be technical staff to provide a back-up for the use of computers in the school. As one teacher commented,

"...if you are going to base a course of work on a computer program and that breaks down, your course is broken down, and therefore you need technical help fairly quickly, because once that's broken down, you've got 30 chidren who are likely to climb the walls and you know, you've got to find something else for them to do".

3. Hardware.

(a). **Insufficient Computers.** Consistently teachers referred to the problem of "once teachers were convinced of using computers, there would be insufficient computers", which, according to the researcher, was a "vicious cycle" type of reasoning. Teachers considered that there would be insufficient computers and so they envisaged difficulties in moving classes to computers or vice versa. Some teachers stated that they felt that every teacher and pupil should be provided with or have access to a computer. They realised that there would always be the problem of insufficient computers as there would always be a lack of finance. They saw the Computer Studies computer room as only temporarily solving the problem.

(b). **Security of Computers.** Teachers said they saw the security of the machines as a problem. They said they believed, for example, that the danger of theft was a consideration to be constantly borne in mind.

(c). **Long Loading Time.** Teachers said they were concerned about the problem of long loading time because they had to use cassette recorders to load programs into the computers in the computer room. This, according to them, could be solved if a network system was purchased or used.

4. Purchase and Evaluation of Software. Some teachers mentioned that there was the problem of not being able to obtain and evaluate software before it was finally purchased. They said they believed that if they were to link in with national networks (for example, Micronet), it might help solve some of these problems.

5. **Class Size and Level.** According to the teachers, they felt that the large class numbers in school, especially in the lower school, would result in the difficulty of using computers. This was thought to be so because some of them perceived the use of computers to be most effective only with small groups. Some teachers said they felt that the computers could be used only in a very limited way, i.e. only for 6th formers.

6. Timetabling.

(a). **Internal Organisation.** Teachers considered that there would be problems in arranging suitable timetables so that computers would be available for as many as would want to use them. This they felt could be solved by internal organisation.

(b). **Booking System.** Teachers said they felt that the organisation of a general booking system for computers, similar to booking film projectors, would be beneficial.

(c). **Inflexibility of Timetables.** According to the teachers, they felt that secondary school timetables were not flexible enough to accommodate the constant changeover of pupils and classes necessary as a result of wanting to use computers when there were an insufficient number of them.

8.2 STRATEGIES AND POLITICS

8.2.1 Headteacher's Strategy

The strategy of the Headteacher had already been covered in detail in the chapter on the background of the school and the history of the arrival of computers into the school. What is noted here is a summary with specific attention being made to the role that the Headteacher

said he played, and to the strategy that he said he had in mind in introducing the use of computers into the school.

The role that the Headteacher said that he wanted to take was that of providing sufficient impetus and support for computers to begin to be used in the school. Mr. Bohr and Mr. Novalis had been assigned to provide a paper as to the initial computer equipment required, and to initiate a trial period for the use of computers, for example, in setting up a computer club.

The Headteacher said that he then decided to provide about 50% of the finance needed to subsidize the purchase of the initial number of computers for the Computer Studies department (from capitation and school funds) and to approach the Parents Association to finance the rest. He provided the incentive to the heads of departments by extending this offer (of providing 50% of the cost towards the purchase of a departmental computer). The Headteacher had also decided to purchase twelve SHARP portable computers for the Mathematics department for a six-week computer appreciation course for all 3rd year students.

The Headteacher then appointed Mr. Bohr to head the newly-formed Computer Studies department as Mr.Bohr was the chief initiator in the introduction of computers into the school. The Headteacher however did not mention any reasons why he decided that Mr.Bohr should still hold responsibility as Head of Physics.

The Headteacher said that his future intentions were to conduct a feasibility study as to how computers could be used across the curriculum in the school; to call in an inspector to provide advice; and to look specifically at office administration. He did not seem to be personally enthusiastic however about using computers for his own administrative work (especially for timetabling).

8.2.2 Teachers' Reactions

At the level of the school, the teachers identified a number of factors which they believed affected the way in which computers were introduced and used in the school which were directly concerned with the strategy and leadership style of the Headteacher. These included :

1. **Role of and Direction from Headteacher.** A number of the teachers highlighted the crucial role of the Headteacher, believing that the implementation of computers into a school was heavily dependent on his own attitude and the direction he gave.

Some teachers said they felt that there was insufficient direction from the top (i.e. the Headteacher) with respect to an overall financial policy for the purchase of computers and computer equipment, so that the way in which money was given out seemed to be haphazard. For example, one teacher felt that due to a lack of direction, two or three departments had developed the use of computers independently and so limited resources were being diluted.

2. **Decision to Purchase Computers.** Teachers said they believed that the decision to purchase computers was made by people who did not know about the individual workings of the departments and the effects that it would have on the departments.

Some of them said they felt that this decision had been a "public-relations" manoeuvre aimed to obtain an image of the school as an innovative school. They said they believed that a school's reputation was not dependent on the number of computers it has, although they felt that the general public's view of an innovative school was a school that had computers. As one teacher commented,

"I think particularly for the school. I think it is one of the selling points for parents and I think in some ways that could be discarded because a school does not stand or fall by the amount of computers it has if it is not effective.... It seems to me that you judge a school by its computers and the fact that we have and some other State schools haven't is a plus in our favour which I don't think is necessarily very useful".

3. **Priorities for Spending Limited Finance.** Some teachers raised the issue that too much money had been spent on computers and that there was no money provided, for example, for much needed basic textbooks. Others said they felt that this was a prevalent feeling as teachers had not been sufficiently convinced that it was worth spending money on computer equipment, or that any purchase that had been made had been sufficiently justified in advance by the heads of departments.

Related to this was the feeling by some teachers that the school was placing more emphasis on providing facilites for the more able pupils and neglecting the average and dull pupils. They said they felt that the present policy on computers would widen this gap.

4. **Roles of Keen Teachers.** Some teachers said they were amused as to how much work was done on goodwill, and felt that the effort put in by individual teachers had had a positive effect on the use of computers in the school.

5. **Double Responsibilities for Mr. Bohr.** Teachers said they were worried that Mr. Bohr was given two responsibilities (as Head of Physics and Head of Computer Studies), without being given the time to discharge them properly. In their opinion, they felt that the Computer Studies department and the Physics department should be headed by different people. According to them, due credit had not been given to the Head of Physics.

Mr. Bohr himself indicated that he felt frustrated that he was expected to do two jobs at a time, and that it was unfair to both staff and pupils as he was not able to devote the necessary time for both of them. As Mr. Bohr remarked,

"They are expecting you to do the job as head of Science [Physics], which you could imagine will keep you fairly busy with teaching and administration, and also wanting me to run the computers, which strikes me as somewhat ludicrous because we are talking about a department really on its own right and Headmasters are reluctant to admit this... It is unfair all the way round I think. Unfair on the staff. It's unfair on the kids".

Teacher	Reactions	Training	Finance/Resources	Hardware/Software	Class Size & Level	Timetable	Curriculum
ENCE DEPARTMENT							
Cano (Head)	* Implementation of comps. in school is very much dependent on Headteacher. * Headteacher may put in money if there are keen teachers and if Headteacher is aware of potential of computers.		* Unsure of requirements needed for a comp. room. * Having sufficient finance to provide comps. for every teacher & pupil who wanted to use them.	* Security of comp. would a problem.			* Pupils may get too much of the same thing in one day. * Different depts should coord to reduce excessive exposure to comps.
June	* Worried that Mr. Bohr was given double responsibilities without more time to discharge it. * Comp. Studies should be a separate dept.	* Needed guidance when learning to use comp. * Found orientatn. course helpful but one hour a week is not sufficient (Prefer a 3-day course in programming and evaluation/ testing of software. * Feels that being a Biology teacher, it is difficult to justify going on a computer course.				* Booking a comp. as easy as booking a film projector	
Mikado	* Effort put in by staff has had effect on use of comps. * Depts should be convinced that it is worth spending money on comp. equipment & resources.			* Once staff are convinced to use comps., there would be insufficient comps. - a viscious cycle.		* As more teachers want to use comps., there would be a clash of timetables. (Timetabling can be solved by internal organisation).	
Bohr	* Frustration of being expected to do two jobs at one time - unfair on staff & pupils. * Insufficient direction from the top w.r.t. financial policy. Thus depts. developed comp. resource indptly. and so resources are diluted.		* Problem of power cuts.	* Danger of theft. * Insufficient computers. * Inability to obtain and evaluate software before purchasing. * Linking in with networks eg. Micronet, may solve software prob.			
TORY DEPARTMENT							
Johnson (Head)	* Bemused by how much work is done on goodwill	* Need to provide actual opportunities to use comps. and to apply to individual & dept. * Good but not sufficient to org. demos.				* Sec. schs. not suitable for use of comps. bec. constant changeover of pupils & classes.	
Joachim	* Develop line from top that comps are "the greatest thing".	* Provide in-service trg. and confs.	* School should provide support in terms of available facilities.				

Figure 8.1

o Teacher	Reactions	Training	Finance/Resources	Hardware/Software	Class Size & Level	Timetable	Curriculum
Ridley	* Unhappy that due credit has not been given to Mr. Bohr. * Comps. should be under the control of comp. teacher and one or two colleagues who know about comps. and have access to suitable programs. * Heads of depts. must first justify purchase of comps. * School office should be encouraged to use comps for admin.						
Malory	* Should not expect comp. teacher to mend machines and teach at the same time.	* A trial to be done to discover the likely problems & prep. needed. * On-going staff trg. prog. should be a priority - regularly and for diff. levels.	* Physical difficulties of moving class or computer. * Insufficient classroom space & desks, let alone, comps. * Impt. to have comp. teacher to be backed up by technical staff.				
XGRAPHY DEPARTMENT							
Coleridge (Head)	* Priority of teachers to use comps. is not high enough.	* In-service trg. essential and to be taken by keen teachers. * Org. different events which demonstrates different uses and applications of computers.	Purchasing network would be in compt. to other school needs like purchase of new school minibus.	* There will always be the problem of insufficient computers (Having a comp. room only temporarily solves this problem). *Long loading time (Network system would help). * Physical problem of setting-up the comp. equipment.			
Constance	* Decision to purchase comps. was made by people who did not know about individual workings of dept. and effectiveness of decision. * Purchase of books should be a higher priority than comps. * Against the thinking that the school's reputation is dependent on number of comps it has. * School policy concentrates too much on brighter pupils and neglects the average and dull pupils.						*Syllabus dictates whether comp. is useful tool or not.

Figure 8.1 (contd.)

No	Teacher	Reactions	Training	Finance/Resources	Hardware/Software	Class Size & Level	Timetable	Curriculum
	. Hugo	* Too much money spent on comps. and no money for much needed basic textbooks.				* Used in a very limited way - only for 6th		
	MEMATICS DEPARTMENT							
	. Joule	* School has neglected lower-ability pupils as there is no special scheme for them to use comps.						*Exams. limit syllabus. *Not flexible enough. *Comps. not a priority bec. not integral part of course.
	. Jackson		* Need to use part of school's IST to provide information & awareness of the uses of compe. for each subject and not just comp. programming.		* Need a lot more comps. if going to use frequently in lessons for various subjects.			
	Sully		* Little incentive to resume lunchtime course even though it was beneficial (as there was people to guide). * Prefer a week-long computer orientation course. * Difficult to attend course outside of school as finance is limited and one needs to be nominated.					
	INESS STUDIES DEPARTMENT							
	Rubens (Head)			* Problem of finding suitable & safe place. * Problem of finance to buy computer. * Hassle to take comp. in & out of cupboard.		* Large class numbers a problem in lower school.	* Problem of arranging suitable timetables so that comp will be avail.	*Struggle to cover entire syllabus esp. *A* levels.

Figure 8.1 (contd.)

Teachers said they also felt that the computer teacher should not be expected to mend computers and teach at the same time, but that technical back-up and staff should be provided.

8.3 THE CURRICULUM

A likely problem highlighted by teachers was that unless curriculum planning and development in relation to the use of computers was started (for example, the integration of the use of computers across the various subjects), computers would be used in a rather ad hoc manner. For example, they felt that some teachers might choose to use computers to teach the same thing (using a database for example) to pupils, not knowing that it was covered by other teachers in another subject only recently. In their view, they were worried that pupils might get too much of the same thing in one day. According to them, they believed that departments should coordinate so as to reduce any excessive exposure to computers.

Some teachers also mentioned the effect that the syllabus had on the use of computers in their teaching and in the school. They said they saw the syllabus as limiting the use of computers, as computers were not an integral part of the syllabus and so was not seen as useful tools or a priority for teachers. They also said they felt that the syllabus was not flexible enough, and that the examinations within the syllabus limited teachers in their use of computers in their teaching. For example, according to them, they felt that, especially for the "A" levels, there was already a struggle to complete the syllabus in time for the examinations, let alone having time to use computers in their teaching.

8.4 TEACHERS' ORGANISATIONAL CONSTRAINTS AND SOLUTIONS (EDUCATIONAL LEVEL)

Eleven of the fifteen teachers mentioned factors that were external to the school but would affect the use of computers in the school. The teachers that did not mention any factors at this level were Mr. Joachim (History), Mr. Hugo (Geography), Mrs. Jackson and Miss. Sully (both in the Mathematics department).

Teachers commented on a wide variety of external factors that had affected the use of computers in the school (This is summarised in Figure 8.2). There was a feeling of being limited or restricted by these external factors over which they have little control. These factors can be grouped under three main headings :

1. **Software.** Four aspects that were related to software were expressed. They included :

(a). **Commercial Software.** In their opinion, teachers believed that commercially available software was too expensive.

(b). **Software Development.** Teachers said that there was no real development of software by schools. They said they believed that experienced teachers, computer experts, representatives from examination boards, universities and colleges, and journalists should come together to develop software. Some said they felt that teachers should get together to exchange ideas and software that they had written.

(c). **Lack of Guidance.** According to some teachers, they believed that there was no guidance provided in the vetting and testing of software. They said they felt that groups in teacher centres, or universities and colleges should be the ones to test software and to provide guidelines similar to examination syllabus.

(d). **Communication of Software Information.** Teachers stated that there was poor publicity and communication between schools and software houses. They said that the exchange and transfer of information should be looked into more seriously. They said they felt that LEAs should belong to central software development organisations to provide the publicity for suitable machines and software to teachers. According to them, they felt that software information should be made available to teachers in subject-related periodicals or teacher magazines and not just in computer magazines. One of the teachers suggested that

departments of the same subject in the same geographical area should get together and exchange information.

2. **Finance.** They perceived the problem at two levels :

(a). **Provision of Adequate Finance.** The first problem was that there was confusion (or lack of direction) as to whose responsibility it was to provide sufficient finance for the introduction of computers into schools. One teacher regarded it is as "a bit of a joke" that schools were expected to produce good results without having adequate finance. He compared the move towards computers as being as important and significant as the move to comprehensive education but the problem with computers, he said he believed, was that there was not sufficient finance to effectively back-up such a move. With respect to the government's scheme to subsidize a computer in each school, he said he felt that it was a "whitewash idea" as a school could range from having a very small number of pupils that was fighting off a school closure in one part of the country, to a 2,000 plus comprehensive in another, and that proportionately, this would be unfair.

Others said they felt that it was unfair for Parents Associations to provide the necessary funds to purchase computers as schools in the poorest areas would thus not be able to afford computers. They said they believed that the County themselves (or that they, the County, should impress on the DES) to provide the finance needed as the cost for introducing computers into schools was prohibitive for individual schools.

(b). **Class Sizes.** The second problem was that of large class sizes, especially in the light of educational cutbacks. Teachers said they believed that having sufficient computers, small class sizes and finance were inter-related and beyond the control of the departments or individual schools, as schools were pressurized to keep pupil numbers up so as to obtain the necessary finance. As one teacher remarked,

"...there's really nothing you can do to make that group permanently smaller. So I think you can only think of it in temporary terms; and that really is the Head of Departments that's concerned, and that's very hard to do because of the numbers we have... But obviously they have got to keep the numbers up for almost financial reasons. I mean you only get a certain amount of money per child. If you got too few children, then that can't be too efficient".

3. Expertise and Training.

(a). **Support from LEAs.** This was somewhat related to finance as teachers said they felt that the proper training of teachers was "impossible" because of spending cuts. According to them, they believed that the Educational Authorities should provide extra training for staff and finance for such courses, and that support should be given in terms of providing time for in-service training and the provision of supply teachers to replace those on courses.

Teachers considered that local advisory staff in the County should make themselves aware of computers and related computer problems in schools, and that the County should train their Inspectorate and provide schools with the necessary expertise they might need. Teachers said they believed that computer experts should also be called in to schools or be made available, not via one-day conferences, but through programmes and workshops at teacher centres with "hands-on" experience given. In the teachers' opinion, they felt that most computer courses were presently held in the evenings and so teachers were unable to attend due to other commitments. Some of them said they felt that any courses organised nationally (for example, the INSET courses), should be more than just a two-day or three-day course.

(b). **"Marketing" the Use of Computers.** Teachers said they believed that the introduction of computers should be done with careful planning; with sufficient prior research; and that the use of computers should be "marketed" so that the same mistakes made with CDT, Home Economics, language laboratories etc. would not be repeated. As one teacher warned,

"Education is terribly bad at selling what it produces to employers, to convince them [that a course in using computers in schools was important for industry]... All I'm saying is that I do think that, and if computers are vital, it must be planned carefully and must ensure that there is enough teachers trained to get the full use out of them".

TEACHERS' ORGANISATIONAL CONSTRAINTS AND SOLUTIONS (EDUCATIONAL LEVEL)

S/No	Teacher	Software	Finance	Expertise/Trg
SCIENCE DEPARTMENT				
1.	Cano (Head)	• Sc. depts from various schools in an area should get together to exchange info.		
2.	June		• Finance, class sizes & comps are inter-related and outside of purview of school.	
3.	Nikado			• Ed. Authorities should provide : - Extra trg for staff. - Finances for courses. - A supply of teachers to replace those on course. - Time for in-service training.
4.	Bohr			• Proper trg. of teachers "impossible" because of ed. spending cuts. • Most courses held in evenings and teachers are thus unable to attend.
HISTORY DEPARTMENT				
5.	Johnson (Head)	• Transfer of info. should be looked into • Comp. experts, experienced teachers, representatives from exam. boards and journalists should combine effort to develop software. • Software info. should be made freely available to teachers, not in comp. magazines but in subject-related periodicals.	• Not sufficient finance to back-up govt.'s introduction of comps in schools. • Govt.'s scheme - "whitewash idea".	• Experts should be called to help schs. • Expertise should be obtained not via one-day confs. but through progs. & workshops at teachers' centres with "hands-on" experience.
6.	Joachim	NM		
7.	Ridley		• LEAs should provide the finance to join networks as cost is prohibitive for individual schools.	• Intro. of comps. should be done with careful planning, prior research and should be "marketed".
8.	Malory		• Unfair for PA to fund purchase of comps. because schools in poorest areas would never have the chance. • County should impress on DES that they should provide all the funds for introducing comps.	• Local advisory staff in County should make themselves aware of comp. problems in schools. • County should make available to their Inspectorate any expertise needed.

Figure 8.2

S/No	Teacher	Software	Finance	Expertise/Trg
GEOGRAPHY DEPARTMENT				
9.	Coleridge (Head)	* No real development of software by schs. * Poor publicity & communication betw schools and software houses. * LEA should belong to central software development orgs. & provide publicity for suitable machines and software. * Groups in teacher centres, or univ. and colleges should test software and provide guidelines similar to exam syllabus; & also produce software by providing programmers to work with teachers.		
10.	Constance	NN		
11.	Hugo	NN		
MATHEMATICS DEPARTMENT				
12.	Joule			* Should be more than a 2 or 3-day course.
13.	Jackson	NN		
14.	Sully	NN		
BUSINESS STUDIES DEPARTMENT				
15.	Rubens (Head)	* Commercially available software are too expensive. * Economics teachers should get together to exchange ideas and software they have written.		

Figure 8.2 (contd.)

CHAPTER 9 : ONE AND A HALF YEARS LATER.....

9.0 INTRODUCTION

This chapter provides a very brief picture of the actual use (or non-use) of computers by these teachers, and of the progress (or lack of progress) made by the heads of departments in the implementation of computers into their departments, one and a half years later. The chapter begins by looking at the teachers (including the views that the heads of departments had, as teachers, in their use of computers). The main questions (Appendix G) asked in the interviews were aimed at finding out the frequency of computer use by the teachers since the last time they were interviewed; the problems they had encountered (either personal problems or organisational problems); and any future plans they had in using computers. Some teachers were able to answer all of the questions, while others were unable to do so.

The final set of interviews also included interviews with the five heads of departments and the Headteacher. This was to obtain a brief overview of the progress (or lack of progress) of the different strategies used by the heads of departments in introducing the use of computers into their departments, and the Headteacher introducing them within the school. The questions asked (Appendix H) were directed at finding out the head of department's/headteacher's opinions of the progress made in introducing the use of the computer(s) in their department/school; the members of staff in their department/school they felt were using computers (including how often they were using it and why); the problems the head of department/headteacher encountered in introducing the use of computers in their department/school; any future plans they had, and whether they saw any radical changes as being necessary.

The head of the Mathematics department was not available to be interviewed but finally agreed to complete a questionnaire which covered similar issues. This however, was answered very briefly by the head of Mathematics and no attempt was made to pursue this further.

Each section begins with a general description of the "state-of-play" regarding the use of computers within the department. Some of the main obstacles envisaged by the teachers were described, and particular attention paid to whether their views were strengthened or not. Particular attention was also made to new obstacles perceived by the teachers after one and a half years of use (or non-use). A description of how teachers perceived the "success" of the initial introduction of computers was then provided and the future plans for the use of computers by these teachers noted. This is summarised in Figure 9.1.

The perceptions of the heads of departments as to the progress of their strategies in introducing computers into their department is then described. Particular attention is made to the factors they perceived to be critical in encouraging or hindering the use of computers in their department. The reactions of the teachers to these strategies, one and a half years later, was then noted.

A description of the use of computers in other departments not chosen in the sample is also provided at the end of the chapter so as to provide a brief overview of the use of computers within the school as a whole, one and a half-years later.

9.1 THE STATE-OF-PLAY ONE AND A HALF YEARS LATER

9.1.1 The Science Department

9.1.1.1 Usage

The Science department took a few months before they were able to purchase a cassette recorder. Having purchased it they realised however, that they needed to upgrade the computer to a model B. This had been held up by the County. Additional problems arose in that the department's funds that were set aside for the purchase of software was "used" up when

the need for purchasing stationery became critical. Hence no suitable software was available for the department.

Out of the four teachers chosen in the sample in the department, three of them had used the computer since their last interview. Mr. Cano was the one who had not used the computer in his own teaching since his previous interview. He was however very conscious that he "ought to".

Mrs. June had the opportunity to learn basic programming (about five afternoon sessions, once a week) and to develop a short relevant computer program through her MSc. course at the local university.

Mr. Mikado had used the computer since the last interview but not as much as he had hoped to. He had used it for calculations in Physics experiments (for 4th/5th years, for example, in calculating the refractive index of light). Occasionally he had allowed the 6th form to use the computer on their own for their calculations. His other involvement was with the computer club (helping Mr.Bohr in supervision at lunchtimes). He had also used the computer for administration, for example, in examination answer analysis where each pupil's answers were broken down at different levels (i.e. at the pupil level or class level). At present, both the Physics and Geography departments were using this program. As head of house, Mr. Mikado was also trying to develop some software, for example, in screening tests for 2nd and 3rd years, details of "pupils at risk", court reports, options, grades/reports etc.

Mr.Bohr, who was also head of Computer Studies, was using the computer extensively for administration and in helping other teachers to use computers in their teaching. He did not however use computers for his own personal teaching.

9.1.1.2 Teachers' Views

After one and a half years, three of the four teachers had not changed their views regarding computers, and the one who had changed his views (Mr. Cano) had mainly reinforced his views and not altered them. Mr. Cano said he felt that "youngsters must be exposed to the use of computers in any relevant subject that it will apply itself to". He said he believed that there was not a lack of enthusiasm in himself in using computers but that he was still keen and determined, even more so now because of the benefits he believed in using computers for his pupils.

9.1.1.3 Main Obstacles That Were Mentioned Before

The main obstacles that were previously mentioned by the teachers in the use of computers included :

1. **Time.** Teachers still said that they had insufficient time to use computers or to thoroughly investigate available software. They also said they strongly felt that since no time was allocated to use computers, it was thus seen as not a priority.

2. **Finance.** This was felt more strongly now than one and a half years ago, as teachers said they realised that this was an on-going battle as money that was set aside last year had to be used to purchase textbooks and other basic stationery. For example, they said that a change of syllabus in one of the years meant that money had to be diverted to purchasing new books to incorporate the new syllabus. Then there was what was felt by the teachers to be the prohibitive cost of peripherals, for example, electronic interfaces needed for laboratory work.

According to them, they were even more convinced that the local education authorities were paying only lip-service (as one teacher commented, "like everything in education") and not providing the necessary money for the use of computers. As the same teacher said, "They dangle the cherries but never give the money to develop it properly".

3. **Training.** Teachers still felt that training for teachers (new and old staff) was important. They also commented they still believed that the education authorities must give the time and money for suitable courses, otherwise it would be a very difficult task for teachers to become familiar with computers.

4. **Software.** Teachers remarked they were becoming more aware that there was more software information coming from the publishers over the last six months, and that the price for software was slowly decreasing. They said however, they still perceived difficulties in knowing what software was suitable for their different classes.

Although one and a half years had passed by, teachers still said they felt that there was a problem in not having a library of software available in the department or school in the way one was available for slides, films etc.

6. **Timetable.** One of the teachers highlighted the problem again that all resources and time were geared to the teaching of pupils who were sitting for public examinations. According to the teacher, this thus made it impossible to use computers for non-examination candidates, for example with remedial pupils, as there were no available resources or time left.

9.1.1.4 New Obstacles Encountered

1. **Technical Limitations.** Teachers said they rapidly became aware of the limitations of having a model "A" BBC microcomputer (i.e. a computer model which had a very small computer memory) with only the cassette facility (i.e. the long time needed to find and load programs). They said they began to realise that most of their software they wanted to use (for example, database programs) needed a bigger memory computer or one with a disc drive.

2. **Slow Technical Response and Help from the Education Authority.** When teachers wanted to upgrade their computers (including the twelve computers in the Computer Studies computer room), they said they found, in their opinion, that the education authority was very slow in upgrading their computers. They remarked that the excuse given was that there was a shortage of the necessary electronic components, although the teachers themselves said they felt that these electronic components seemed to be available in the commercial shops.

Teachers also commented that another confusion which arose was that the Government recommended one type of monitor and printer to be used, while the education authority felt that they were unsuitable and so were not willing to maintain these equipment.

3. **Finance from Industry.** Teachers said that finance was still insufficient. They voiced the view that industry should provide some finance to support the use of computers in education or to provide, for example, more "work-experience" opportunities in computers/computing.

4. **Availability/Accessibility of Computers.** There were now differing views as to the availability of computers in the school. For example, Mr. Mikado perceived the computers in the computer room as being needed mainly for Computer Studies work and so said he felt that there were not enough computers available to be used by other teachers. Mrs. June, on the other hand, saw the computers in the computer room as being more easily available than the computer in her head of department's room. This was because she said she felt that it took a long time to set up the computer system in her head of department's room, which in the end made her look to the computers in the computer room. Others said they felt that ideally, they would have liked to have the computers in the block they were teaching in.

9.1.1.5 Success

The teachers in the Science Department said they perceived their "success" in the use of computers in different ways. Mr. Bohr and Mr. Mikado for example, perceived their success as being able to use the computer for administration. In his opinion, Mr. Mikado perceived his added success as being able to understand the "administration system" more because he had to develop some programs for administration.

Mr. Cano, on the other hand, said he felt that their most important success, even though it was one and a half years later, was that they had managed to purchase a computer. As he remarked, "we've actually got a computer.... It's a lot of hope... You can't make big steps in this place, you got to do it slowly, you know, in schools". Finally, Mrs. June said she perceived the success as seeing the computers to be accessible for her use at anytime.

9.1.1.6 Future Plans

The teachers had different plans for the use of computers in the near future. For Mr. Cano, his plans as head of department tended to play a more important role than his plans as a teacher. His only immediate future plan was to investigate and purchase available and suitable software so that it could be used by his teachers. Mrs. June said her own future plan was to try out the program she was writing for her MSc. course on her "A" level pupils. She did not really know however, when and how she would be carrying it out.

Mr. Mikado said his plans were mainly personal, i.e. using the computer as an administrative tool. For his own teaching, he said he would like to use the PET computers (as they were not being used at present) for calculation work by his 4th and 5th year pupils. His other use would be "for fun", for example, for the computer club.

9.1.2 The History Department

9.1.2.1 Usage

In the History department, a disc drive (80 track) was purchased and the system placed in the History department's room. The disc drive was paid for from school funds. A colour television forms part of the computer system in the department and this is on loan from the resource center of the school, for which the Head of History is also responsible for.

Of the four teachers in the initial sample, one of them, Mr.Ridley, had left the school for another job. The remaining three teachers had all used the computer within the previous one and a half years.

Mr. Johnson had used the computer with the 6th form as a reinforcement to learning, for example, in looking at the economic changes in the 16th century based from data in the computer, and the role of statistics for historians. He had also used it for a group of seventeen (all girls), for a total of six to eight hours in the year. He had also used the computer increasingly for administration. He said he was aware that more teachers in the department were learning to use the computer for administration too.

Mr. Joachim had used the computer in a limited way. He said he used it mainly as a database for himself (in getting and retrieving information) and for administration (pupil records, class lists). As an introduction to the computer, he had used the BBC "Welcome" tape. He said however, that he had not used the computer at all in the classroom.

Finally, Mrs. Malory had used the computer in administration but not in teaching, for example, 6th form tutor lists. She said that she had found it easy (with the help from Mr. Bohr) to obtain a selection of information from the databanks of pupil lists.

9.1.2.2 Teachers' Views

All three teachers had changed their views towards computers in certain areas. Mr. Johnson's views of computers in teaching had changed in that his ideas for using computers for managing large volumes of data for history had been reinforced. He felt encouraged that some history teachers were using programs to address the conceptual questions in history, for example, the problem of conflicts, causation and motivation etc. He said that his personal view of using computers in teaching had not changed however in that he still perceived computers as playing an important part in history teaching. He continued to see computers only as a resource to aid the teacher and that, according to him, it was up to the individual teacher whether he/she used computers or not.

Mr. Joachim said he felt he was more competent in using computers than he had been the previous year (he said he was initially learning to use the computer with a cassette recorder to load the programs in, but that now he was learning to use them with a disc drive). In his opinion, his view of computers as only one of the resources available for teaching had been reinforced. He said he felt that there was still a long way to go in terms of deciding on the approach and method of using computers in teaching and how pupils could have access to them.

In Mrs. Malory's opinion, her perception of the potential of the computer had increased. She said she realised, however, that the actual amount of use made of the computer had not increased. This, in her view, had left her frustrated as this gap had got wider. She said she was disappointed that she had not used the computer for teaching purposes. Mrs. Malory still saw herself as not being competent and hence saw herself as taking a lot of time to do something on the computer which, as she said, discouraged her greatly. In addition, this time spent was, in her opinion, something which she could ill-afford. The exception to this, according to her, was on the administration side where she perceived that there would be progress in using computers in administration because it saved teachers' time in the long run. Thus she believed that teachers

might be prepared to put in the time to use computers in this area. She said however that she still felt "very hurt" that only the able pupils were exposed to computers in the school.

9.1.2.3 Main Obstacles That Were Mentioned Before

1. **Resources.** Teachers had specific requests to improve their use of computers in teaching. One teacher said she felt that a better printer was needed and that a more sophisticated database program was preferred; while another said she realised that there was no facility (for example, big enough monitors) to demonstrate programs to an entire classroom.

2. **Finance.** Teachers still said they felt that it was expensive for schools to purchase and use computers. They said they believed that the take-up of computers in schools would be very slow if school and education authorities did not provide the necessary finance. They realised that buying them out of department funds was unrealistic.

4. **Training.** They said they believed that the training of staff was essential as teachers needed to understand how to use computers. According to them, this training had to go hand-in-hand with the purchase of equipment.

5. **Technical Assistance.** Teachers continued to mention the need to have a computer technician to set the computers up and to load programs in.

6. **Time.** Teachers said they felt that they were still "too busy" and that they had not made the opportunity to use the computers. As one teacher said that they were "....barely keeping their heads above water".

9.1.2.4 New Obstacles Encountered

1. **Technical Upgrade and Support.** They said they were still waiting for the computer in the department to be upgraded by the County. One of the teachers said he felt that the County had not, until recently, had an official in the County's Media Resource Centre who was aware of computers technically and so could provide the support that was needed. He said however that he realised the County was also swamped with other computer upgrades that needed to be done and so was behind schedule.

2. **Access.** Some of the teachers said they felt that the development of Computer Studies had led to the computers in the Computer Studies room being less available for other departments to use.

9.1.2.5 Success

As in the Science Department, teachers perceived "success" in different ways. Mr. Johnson said he was encouraged by the ease with which pupils came to terms with computers, although he said he realised that this was helped by the fact that he used computers with able children and with those who might have computers at home. He was also encouraged by seeing other teachers using programs to generate discussion. Finally, he saw the acquisition of a 26" television monitor which could be used for computer demonstrations as an achievement for the department.

Mr. Joachim's perception of success was simply in learning how to load a program into the computer. This he achieved by using the BBC's introductory program ("Welcome Tape"). Mrs. Malory's perception of her success was in the ease with which she said she saw herself able to retreive information for her administration work.

9.1.2.6 Future Plans

Some of Mr. Johnson's future plans included using computers for 4th and 5th years. He was already using computer material for two units of the subject. This future use, according to him, would involve a total of about ten hours in a year - part of this for the 6th form, especially in increasing the use of computers for "A" level personal research (for example, interrogating data); and part for the 2nd year on work in archaeology simulation. He was however waiting for appropriate software on these subjects to be purchased.

Mr. Joachim's future plans was only for administration work, especially for wordprocessing where he said he intended to use computers to try to establish the reading age of his pupils (instead of using specialised textbooks). He admitted however that he had first to find the time to be able to do this.

Mrs. Malory's future plans to use computers were also in the area of administration where she hoped to put as much data about her pupils on computer as possible. She also said she would like to use the computers for her low-ability pupils.

9.1.3 The Geography Department

9.1.3.1 Usage

Mr. Coleridge, the Head of Geography, had always been one of the teachers most enthusiastic about the use of computers in the school. He began to take a more active role when the BBC computers arrived in the school. He was one of the heads that initiated the idea of purchasing a printer and disc drive that would be made available to any member of staff in the school, and was able to pursuade the Headteacher to provide the necessary funds for this purchase. This "workable" computer system was kept in the Geography department room and made available and accessible to any member of staff. The Head of Geography had also developed a general

purpose database program which could be used for example, for pupil records. A wordprocessing package was then made available with the system.

Out of the three teachers chosen in the sample, one teacher, Miss. Constance, had left the school within the one and the half years. She had another teaching post offered to her in a different part of the country. Of the remaining two teachers, both of them had used the computers since the last interview, one of them, Mr. Hugo, rather dramatically.

The first of the teachers, Mr. Coleridge, commented that although he had used computers in the school, there was hardly any more movement in the use of computers in the classroom by him or any of his staff. He said he felt that there was only a total of about ten hours of computer use (each working on a single computer) for the 4th and 5th years. According to Mr. Coleridge, the computer was used mainly for graph drawing, statistical presentation and data collection. For the 6th form, he mentioned that the computer was used for about a total of twelve hours a year (also for statistical presentation and data collection) with pupils again working by themselves. He said he realised that there was no use made of the computer for the ITU (Intensive Training Unit) pupils, although he said he would very much have wanted to use computers with them.

Mr. Hugo, on the other hand, who was initially rather antagonistic towards computers, had a change of view. In Mr. Hugo's opinion, the turning point for him was when, as he said, he was being "bullied" by two teachers (Mr. Bohr and Mr. Coleridge) in using the computer for his options work. He said he felt that it was Mr. Coleridge who worked particularly hard to find out exactly what was needed and required by Mr. Hugo to use the computer for the options work, and it was he who eventually wrote a program that was suitable for Mr. Hugo*. In addition, Mr. Coleridge made himself available whenever Mr.Hugo needed help and even went to Mr. Hugo's home when difficulty arose with the use of the computer and program. Within three months, most of the preliminary options data was entered into the computer and Mr. Hugo was able to bring the computer and printer home to enter all the other necessary information. Mr. Hugo's experience in using the computer was described as a conversion experience, as he said,

* This program helped to assign the children for their 3rd year options.

"I'm converted. I've found that it was absolutely superb. It did as they said it would.... You know, it's the old business, you know, with a new thing and an old fogey. You are a bit afraid of something new when you don't particularly understand it altogether. But it did work and it's gone very very well indeed. In fact, I came back the first day of term (which is the first time ever) with everything ready. The preliminary lists were all done and the heads of departments had those lists by the first day..... Whereas a year ago I would have...said no, now I'm definitely a fan of the machine, let's put it that way... much to everybody's amusement".

9.1.3.2 Teachers' Views

Mr. Coleridge said he felt that there was a lot more opportunity to use computers because, according to him, software was becoming more readily available but he still felt that more training was needed for teachers to be able to use them. In his view, there was a movement towards the use of computers in hypothesis testing and so a move towards programs for the gathering of data and statistical testing. He said he believed however that the progress was slow in the school.

During the one and a half years since his last interview, Mr. Hugo said he had begun to realise that using the computer saved him time, and so he became convinced of the value of using the computer. For example, according to him, what would have taken him about a fortnight working in the evenings would now take him about an hour if he were to have done it on a computer. He said he realised that he needed to overcome the idea that the computer could not do the work for him. He said however that one needed to be methodical to be able to use the computer well otherwise mistakes would be made, and that one needed to realise the limitations of the computer. As he said,

"But I think you know I'm fairly logical and methodical in the way in which I work. You have to be on this thing. And I think that has helped me quite frankly in picking this up. I was surprised at how quickly I picked the thing up. I was anticipating that it was going to take a few weeks to pick the thing up and you know, being able to fit it in. But I've been fooled myself in the way in which it's all gone into working and all. And I've been thrilled with it.... It's gone quite honestly, far better than my wildest dreams. I'm delighted".

With regards to the program written by Mr. Coleridge for Mr. Hugo to use, he said that he was impressed with the versatility, accuracy and consistency of results provided by the computer. As

he remarked, "...and as long as all the data is there - no mistakes. The only time when really a mistake has developed is when I've done something wrong and it's my fault."

Mr. Hugo was himself now persuading two other teachers (the teacher in-charge of pupil entry records, and teacher in-charge of examinations) in other departments to use this program. In that way, he said he felt that relevant information could be passed across on the same system.

With respect to the use of computers in teaching however, Mr. Hugo still held the view that computers were making people lazy (but, in his opinion, this was not the case for options work as he saw options work as first having to do all the necessary preparation beforehand).

9.1.3.3 Main Obstacles That Were Mentioned Before

Only one obstacle was mentioned by the teachers and that was in the area of finance. Mr. Coleridge said he felt that there would always be the problem of having sufficient money to purchase adequate software and hardware (for example, printers and plotters) to experiment with the use of computers in the school.

9.1.3.4 New Obstacles Encountered

Mr. Coleridge said he felt that they needed to upgrade the computers and to provide a network facility for them. Otherwise, in his view, progress in the use of computers in the school would be very slow.

9.1.3.5 Facilitators

One positive decision which, according to Mr. Coleridge, had encouraged the use of computers in the school, was that extra money was given in an effort to encourage the use of computers in subjects other than Computer Studies, although the overall money provided for computer use

was still, in his view, insufficient. The money, according to him, was mainly used to purchase relevant software.

9.1.3.6 Success

The main "successes" in the department were mainly due to Mr. Hugo's realisation that the computer could do what he wanted it to do, simply and in a shorter time. Mr. Hugo said he realised that it was important to overcome his fear of being able to cope with something new like the computer and to be able to pick up the necessary skills to make it a success. In his view, it was essential for him to know that Mr. Coleridge was available to help at any time, and this in turn helped to gradually build up Mr. Hugo's confidence in using the computer. As he remarked, "Somebody who has got the know-how and who could put it over and give you the confidence to do it... He [Mr. Coleridge] was terrific in that he showed me how to do it and worked with me and then said get on with it."

9.1.3.7 Future Plans

Mr. Coleridge's immediate future plan was to install the computer network with the help of Mr. Bohr. They were intending to build their own simple network system for the BBC computers in the Computer Studies computer room.

Mr. Hugo's future plans were mainly in the area of administration. He said he would want to continue using the computer for his options work. In addition, he said he also intended to use the computer for his Academic Board work, for example, in recording pupil information like pupil records and lists, for the Board.

9.1.4 The Mathematics Department

9.1.4.1 Usage

The Mathematics Department had only just acquired an 80 track single disc drive, plus a colour monitor, to go with their computer that had been purchased one and a half years ago. Hence, prior to this, the computer system was not set up and staff in the department were not able to use their department's BBC computer.

Of the three teachers that were initially interviewed, one of them, Mrs. Jackson, had left to raise a family. The head of department had never given permission to be interviewed and thus was not included in the initial sample. He was however able to fill in a questionnaire which provided a brief summary of what had been done in the department.

Of the remaining two teachers, Miss. Sully had used the computer while Mr. Joule had not, over the past one and a half years. While Mr. Joule had not used the computer in his teaching, he was one of the teachers who attended the government's computer awareness course to train teachers in schools who had purchased computers under the government's subsidy scheme. He said however that he had continued helping out with the school's computer club, once a week, just to be around and to provide guidance to the members when needed.

Miss. Sully, on her own initiative, attended an evening basic introduction course on computers (but, according to her, it had only involved very basic learning of keyboard skills and loading software) at the local teacher's centre. This was a free course for teachers - four sessions in total, twice in two weeks where, in her opinion, she was able to learn the terms used for computers.

The twelve SHARP computers that were purchased two years previously had hardly been used, with the same reasons given one and a half years ago, i.e. that there was no suitable teacher to teach the intended course on introducing basic programming. According to Mr. Joule, the

SHARP computers were only used by some of the staff, and by his 4th year pupils at the end of term as a, as he said, "a pleasent way to round off the term". In his view, he saw the computers as an "interesting diversion" but said that he would not take it too seriously because he felt that such computers were very limited in what they could do. In addition, Miss Sully commented that she had not used the SHARP computers because she felt that it was not stated in the syllabus that they should be covered.

9.1.4.2 Teachers' Views

According to Mr. Joule, his views of computers had remained much the same from a teaching point of view. He said however that, from an administrative point of view, he was looking forward to using computers as he had recently become aware of how useful and valuable the wordprocessing facilities on a computer could be for him. He said he was thus trying to learn how to use the wordprocessor on the computer properly.

Miss. Sully commented that she still was unsure and did not know how computers could be used in her teaching. She mentioned that she was still concerned about the control of her class if computers were used (especially with her less-able pupils).

9.1.4.3 Main Obstacles That Were Mentioned Before

1. Lack of a Computer System. Teachers were unable to use computers in their teaching as the only computer in the department had recently come "out of it's box" and had not been really set up yet. In addition, they said they felt that there was no software in the department to use in their teaching. They were aware that there were computers in the computer room but saw those computers there as being in frequent use and that it would be difficult to use the computers at a "moment's notice".

2. **Time.** Teachers said they felt that there was no time available for them to use computers. One of them had just been appointed to set up and start a new Mathematics course which thus took up most of his time and was a higher priority than the use of computers.

9.1.4.4 Success

Both Mr. Joule and Miss. Sully said that they used computers so infrequently that they felt that they could not comment on whether the use of computers was a success or a failure for them. According to Mr. Joule, it was, as he remarked, "a non-year or non-event" for him.

9.1.4.5 Future Plans

Miss. Sully had no future plans, as she said she felt that she did not really know how to use computers. She said she still perceived herself to be "ignorant" in the use of computers.

On the other hand, Mr. Joule said he personally hoped to eventually use the computer in the department as an administrative aid rather than as a teaching aid. In his opinion, he would want to use computers for storing material for "A" level work, for example, in storing model answers and in statistical work for his 6th formers.

9.1.5 The Business Studies Department

Usage - During the past one and a half years since the last interview, the Business Studies Department realised that they needed, and were able to upgrade their computer (from a model A to a model B) and to obtain a wordprocessing package for use within their commerce department. The computer however developed a technical fault and the monitor screen kept blanking out and was still under repair.

Mr. Rubens' Views - According to Mr. Rubens, his view of computers in teaching had still not changed. He commented that, since his last interview, he had not used the computer in his teaching. He said he was still eager to use computers and felt that if he had made contact with other Economics teachers who were using computers then he would have been more enthusiastic about using them. In his opinion, he still saw the growing importance of computers in general and said he realised how important it was for students to use computers. Hence, he said, that he perceived an increasing educational importance for computers.

Main Obstacles That Were Mentioned Before -

1. **Time.** According to Mr.Rubens, there was insufficient time for him to work out how the computer could fit in with his teaching, to attend extra computer courses, and to meet with other teachers who could show him relevant software and how to use the computer in his teaching.

2. **Finance.** He again mentioned the problem of having sufficient finance left to purchase the necessary software once the hardware had been bought.

3. **Class Organisation.** Mr. Rubens also said he continued to perceive problems associated with organising a lesson if computers were to be used.

New Obstacles Encountered - Unexpected Costs. Mr. Rubens said that he was not aware how much it would have cost to upgrade the computer in the department to be able to be used as a wordprocessor, and that he was slowly beginning to realise that the computer purchased would not be any good unless upgraded. In his view, he felt that someone should have warned him about this before he made the decision to purchase the computer as the actual costings would now be different. Mr. Rubens admitted that he was frustrated because computer technology became out-of-date very quickly and that there were "all sorts of hidden extras" that were needed which incurred additional expenses if computers were to be effectively used.

E AND A HALF YEARS LATER (TEACHERS)

/No Name	Increased Usage ?	Previous View	Views of Comp. Changed ?	Main Obstacles	Main Facilitators	Success	Future Plans
CIENCE DEPARTMENT							
. Cano	No	+W	Yes (Views reinforced)	*Time *Finance *Training *Limited Software		*Purchase of Computer.	*Investigate Software.
. June	Yes (As part of MSc course).	+C	No	*Time *Expertise *Training *No software library avai.		*Saw comps. in comp. room as accessible.	Try her comp. program for her "A" level pupils.
. Mikado	No	+C	No	*Availability and cost of hardware. *Time for writing software. *No finance from LEA or industry.		*Now understands admin. system better.	For personal use in admin. & for CAL work for personal teaching.
. Bohr	No	+C	No	*Time *Slowlness of County to upgrade comps. *Space for teaching computer studies.		*Admin. use	*No (Left sch. at end of academic year).
STORY DEPARTMENT							
Johnson	Yes (In admin. and 6th form teaching)	+C	Yes (Reinforced for admin. use). No (for teaching)	*Better printer needed. *More sophisticated database wanted. *Insufficient finance provided by LEA. *Staff trg. essential. *Slow comp. upgrade & technical support.		*Encouraged by ease with which pupils come to terms with comps. *Encouraged by the way he could use comps. *Seeing other teachers using comps.	Increase usage for each year.
Joachim	Yes (for admin. & database) No (for classroom teaching)	-	Yes (Feels more competent using computers.	*Too busy.		*Learning to load a program into the computer.	*For admin. & wordprocessing.
Ridley	Left School in Summer '83.						
Malory	Yes (For admin.)	+W	Yes (Perception of potential of comp. increased).	*No time *Help needed to set-up comps. *No facility to demonstrate progs to class. *Frustrated & disappointed bec. of slow progress in learning how to use the comp. and for teaching.		*Ease of retrieving admin. information.	*To put data of pupils on comps and using comps for low-ability pupils.

Figure 9.1

E AND A HALF YEARS LATER (TEACHERS)

No	Name	Increased Usage ?	Previous View	Views of Comp Changed ?	Main Obstacles	Main Facilitators	Success	Future Plans
GRAPHY DEPARTMENT								
	Coleridge	Yes (But slow progress)	+	Yes (More +ve. Sees a lot more opportunities	*Need to upgrade comps. and provide network facility. *Money for software and hardware.	*Extra money given to encourage use in other subjects.		*To install a network with Mr.Bohr's help.
	Constance	Left school in the Summer of '83.						
	Hugo	Yes (for options work).	-A	Yes admin. (For due to Mr.Coleridge & Mr. Bohr). No (for teachng)	*Getting over the idea that the comp. could not do the work for him. *Danger of pupils still becoming lazy in their thinking.	*People who were available to help at any time and build confidence.	*Realising that the comp. can do the reqd. task and in a shorter time.	*For admin. admin. use - options work and pupil records.
EMATICS DEPARTMENT								
	Joule	No	-	No (for teaching) Yes (for admin.- aware of usefulness & value of word processing).	*Comp. in dept. was not avail.(still in box). *No software. *No time. Setting-up a new Maths course. *SHARP comps.- used mainly by staff. Intended comp. awareness course did materialise.		*Used comps. so infrequently that he could not say whether it was successful or not - a "non-year or non-event" for him.	*Use comp. for personal admin. *Statistical work for 6th form.
	Jackson	Left school in the Summer of '83.						
	Sully	Yes (Attended an evening comp.course on her own initiative).	?	No	*Still did not know how comps. could be used in teaching.			No
NESS STUDIES DEPARTMENT								
	Rubens	No	+W	No (for comps. in teaching) Yes (for comps. in general)	*Insufficient time. *Finance for software after obtaining hardware. *Problem of organising lessons. *Unexpected costs.		Not a success bec. he had not used it for teaching.	No (Left school at the end of the academic year.

re 9.1 (contd.)

Mr. Rubens' Success - According to Mr. Rubens, he had not had any success in using computers as he felt that he had not really used computers in his teaching.

Mr. Rubens' Future Plans - According to Mr. Rubens, he hoped to use computers in his new job as a lecturer in a further education college. He said he felt that this would be possible as there was a bigger computer resource department in the college that he was going to and thus anticipated that finance would be less of a problem.

9.2 STRATEGIES AND POLITICS

9.2.1 The Heads of Departments' Views of their Strategies

9.2.1.1 The Science Department

Mr. Cano said he felt that it had been an unsuccessful year but that he took encouragement from the fact that this lack of success had now made him all the more determined. According to Mr. Cano, the pilot work that he suggested one and a half years ago could not be carried out because, in his view, there was no suitable software available to use in the pilot study. Mr. Cano said he perceived his main achievement as being able to encourage the one or two teachers who had tried to use computers. In his view, he wanted to provide a positive response as head of department when any of his teachers wanted to use the computer.

Mr. Cano said he was disappointed that teachers had not come into his room to "have a go" on the department's computer, mentioning that he did not set the computer system up in the summer term because he was very discouraged from the response of the first two terms when he did set it up. At the most, he said he felt the department's computer might have been used only once or twice throughout the past one and a half years. Some other teachers, he said he realised, might have used the computers in the Computer Studies' computer room. He noted

however that more and more pupils were wanting to use the computer in his room during lunchtimes. This eventually had to be curtailed due to the teachers' industrial action.

For the future, Mr. Cano said he felt that he needed to keep on encouraging his teachers. He was initially reluctant to do so however as he perceived that he did not have all the necessary facilities. He also remarked that he wanted to coordinate with the new computer studies head (whom he felt had been given a wider brief and who was intending to make available computer facilities for other teachers and departments). Mr. Cano's other plans included visiting, previewing and obtaining software from publishers, teacher centres, other school science departments, universities and the local computer users group; and to provide in-service training for his staff (as he said he felt that he needed to demonstrate the different uses of computers to encourage his teachers to use them).

Science Teachers' Reactions - Teachers said they did not perceive a definite continuing computer policy within the department, but were aware of the availability and access of the computer in the department. They said they were not discouraged from using computers. As one teacher commented,

"I think people are encouraged but not exactly actively encouraged, but certainly not... people are never discouraged. We will always be very welcomed to use computers if it fits in. So as far as that goes, there's certainly been some encouragement but not sort of... a lot of pushing".

9.2.1.2 The History Department

Mr. Johnson said he felt that his initial strategy of making the department's computer available for staff had been achieved. In his opinion, this was especially so in the area of administration (especially for pupil records and for option work). According to him, he felt that some members of his staff were interested in using the computer (although he felt that there had been very little actual use) but that they (and especially the part-time staff) were unable to use it more because of time and other commitments. In his view, the "success" for him was that he believed that teachers within the Humanities were becoming more aware of the potential of the computer,

and that software was being developed to meet the needs of these teachers and pupils at the appropriate level.

Mr. Johnson admitted that he did not have prior consultations with his teachers before he purchased the computer. He said he felt that it was not necessary because the purchase of the computer was not a simple department purchase but heavily subsidised by the school (50%) and that both the disc drives and monitor came from school funds. So, in his view, it was not essential to ask his teachers when most of the money came from school funds. In addition, he mentioned that as a matter of policy he felt that, as head of department, he was paid to make certain decisions, but commented that, in this case, if teachers were "bitterly" opposed to purchasing the computer, then he would have talked it through with them. According to him, he had no such indication that this was the case and felt that it was not an issue. Finally, he remarked that as a head of department, he had to consider the future of the department.

He said he did not see the need for any changes in his strategy, apart from the need to provide workshops to "make" teachers (especially Inspectors and Advisors) aware of how much they were hindered in the use of computers because of, what he terms as "technical problems". According to Mr. Johnson, for the coming year from the time of the interview, he would like to use a suitable program on Archaelogy with his 2nd and 3rd year pupils, a School Council's program with his 4th and 5th year pupils, and a data retrieval package with his 6th formers.

History Teachers' Reactions - Teachers said that although they initially felt isolated because the department computer was bought without them being informed, they commented that their feelings had changed and that they now accepted the situation as it was, seeing computers, as one teacher remarked, "as part of the furniture". According to them, they believed that their department head was now informing them about his intentions for using the computer and of purchasing suitable software.

In their opinion, they felt that the department as a whole should see the computer as purposeful and necessary, and not to be monopolised by a single person. Teachers said they found the department computer as easily accessible and saw their department head as encouraging them and showing them how to use the computer. In their view, they saw him as putting a lot of his personal time to encourage the use of the computer for administration (but not for teaching as yet). They warned however that it should be done not on an individual or ad hoc basis.

9.2.1.3 The Geography Department

In Mr. Coleridge's opinion, most of his staff in the department had seen the department computer being used by other members of staff but this, in his view, was only incidental. According to him, the computer had been used mainly for administration outside of the department. For example, the computer was used by the Printing Club (of which Mr. Coleridge was teacher-in-charge) for business use, for estimation, for wordprocessing; and by the school's office staff in helping to type in pupil information. His main "success", according to Mr. Coleridge, was in being able to convince senior and office staff that the computer could be used for administration and that it would be trouble-free.

Part of his initial strategy was to formalise a computer introduction course for staff in his department. This however, according to him, did not materialise. He said he felt however that there was an increase of interest in the use of computers. For example, at the department level, the computer was used mainly for wordprocessing (although one of the problems they encountere d was a lack of a printer); and at the school level, the computer was used as a database (for pupil records and options) for all the staff in the school. Mr. Coleridge mentioned that he himself had written and developed the database program that was being used by some of the staff in the school. In that way, he said he felt that the department computer had become more of a school computer.

Mr. Coleridge mentioned that there had not been much use of the computer in actual lessons. He admitted that he himself had only used the computer about three times - for class demonstration. Overall, Mr. Coleridge said he felt that the computer was about to make an impact into the school as teachers were interested in wanting to use the computer for administration work (especially for wordprocessing) but felt that the breakthrough into the classroom would be more difficult.

His future plans were to enable the gifted children's group to use adventure programs; to wait for the upgrade of the computers; to purchase a colour monitor and printer; and to convince the office to use computers for their staff cover system.

At the time of the last interview, Mr. Coleridge had just taken up his new post as head of the Computer Studies Department (while leaving the Geography department), with a wider brief for encouraging more extensive use of computers throughout the school.

Geography Teachers' Reactions - This was mainly Mr. Hugo's reactions as the other teacher, Miss. Constance, had already left the school. Mr. Hugo saw the help and guidance of Mr. Coleridge as essential in encouraging him to use computers for his options work. This was described in detail in the previous chapter.

9.2.1.4 The Mathematics Department

As was previously mentioned, the head of the Mathematics department was not available to be interviewed and a questionnaire was thus designed to obtain the necessary information. Questions were asked that were directed towards finding out the progress of the use of the department's computer, the use of the SHARP computers purchased, and the future plans of the department with respect to the use of computers. As the department had only just received their monitor and disc-drive and so was, until then, unable to set up the computer system for

use, the majority of the questions had a "not yet applicable" answer given by the head of department.

With respect to the use of the SHARP computers, the head of department only mentioned that the plans were for use with a computer awareness course for the 3rd years, but gave no indication as to whether it was carried out or not, and to what extent.

Mathematics Teachers' Reactions - Teachers said they regretted that guidance from their department head as to the use of computers in the department was not forthcoming. According to them, they perceived their head of department as very busy with school responsibilities (he was in-charge of staff cover and helped the Headteacher with timetabling) and thus did not have the time to discharge his department responsibilities adequately. They said they felt that it would have been helpful for someone (which according to them should still preferably be their department head) to give some examples as to how computers could be used in Mathematics. According to them, however, they felt that they were expected to be left to themselves to learn how to use computers in their work.

9.2.1.5 The Business Studies Department

In his view, Mr. Rubens said that, to a certain extent, there had been no success in the use of computers in the department as he did not see that an impact had been made as far as the students were concerned (i.e. no pupil had actually used them). His only achievement, according to him, was that they had managed to purchase and set-up a computer system that was almost ready to be used. He also said that he realised that it was the other teachers in the department who were getting more organised with respect to using the computer.

Mr. Rubens would be leaving the school at the end of the academic year in which the interview was conducted. He had obtained a lecturer's post in a further education college lecturing in the same field.

9.2.2 Obstacles Encountered by the Heads of Departments

9.2.2.1 Obstacles Mentioned Before

1. **Time.** Heads of departments said they felt that teachers did not have the time to familiarise themselves with the computer because there always seemed to be something else that was important, like designing and marking examination papers, writing reports, or preparing lessons. The computer thus tended to be, according to the heads of departments, the last priority for teachers to get sorted out.

2. **Finance.** Heads of departments had hoped that they would have been able to purchase a number of software programs. They complained however, that the money that was left aside for such purpose had to be used to purchase additional stationery (because of extra groups, new courses, etc.). Heads of departments, on looking back, mentioned that they wished they had purchased the software at the very beginning when the money was available. This, they said, similarly applied to the finance needed to enable teachers to attend the necessary courses to acquire the skills to use computers.

3. **Software.** Teachers said they believed that there was still a problem of having sufficient software which, according to them, was related to the problem of sufficient finance. Heads of departments were frustrated that software could not be obtained on approval. They said they still saw the need for having a central source of information for suitable software, seeing the teacher's centre as being that source of information. One head of department (Mr. Coleridge) managed to convert some programs on the PET computer to the BBC computer, and to persuade some pupils to type in some programs from magazines.

9.2.2.2 New Obstacles

1. **Memory Upgrade.** Heads of departments commented that they soon realised the memory limitation of the BBC model A computer as most of the software they wanted to use required a larger machine memory. This thus meant that they were reluctant to purchase any software until an upgrade to their department computer had been done.

2. **Organisation and Responsibility at County Level.** Heads of departments remarked that there were two problems of organisation at the County level. They complained that the County had been very slow and inefficient in repairing two department computers which had developed faults during the past one and a half years (History and Business Studies departments). This, they said they felt, had slowed progress in the use of computers in these two departments even further.

The other problem which the department heads expressed was that the County had not announced the types of peripherals (for example, monitors) they would approve. This, according to the department heads, meant that schools were thus kept waiting and unable to improve on their computer systems as the County would only guarantee approved peripherals.

3. **Finance.** Heads of departments commented that they were rapidly becoming aware that extra finances were needed for "odds and ends", for example, floppy discs. They said they felt that there was a lack of foresight in not obtaining a comprehensive list of all the basic equipment needed to effectively use the computer at the very beginning.

4. **Slow progress / Rapid Obsolescence.** Heads of departments realised that their progress in obtaining suitable peripherals and using computers was very slow. They said that they felt even more frustrated when they realised that once everything was sorted out, they would discover that their computer systems had become obsolete.

9.2.3 The Headteacher's View of his Strategy

According to the Headteacher, his initial plans for introducing computers into the school had progressed very well. For example, he said he felt that the Computer Studies course was completely "off the ground" and that the feedback he had received had been positive. In his view, he believed that this course would continue for the 4th and 5th years, and for "A" levels (as two students who had opted for it) for the following year.

According to the Headteacher, there had been major interest shown and actual use in the various departments in their teaching, especially in the History and Geography departments. In his view, there had also been advances in the use of computers in office administration (especially in the compilation of school lists). He was also aware that Mr. Hugo was now using the computer for his options work. The Headteacher also commented that the Mathematics department were continuing to conduct their computer awareness course for all the 3rd year pupils (a five to six week, one hour per week session, course) on the SHARP computers. (This, according to the observations of the reseacher was not the case).

In the Headteacher's view, things had been moving roughly at the pace that he had planned, but he realised that the demands for the computers had increased rapidly. In his opinion, no staff had shyed away from the use of the computers because of disappointments, but instead felt that some of the staff were familiarising themselves with the computers or using them to teach. According to him, the two main uses were for classroom use (this was so for the History, Geography and Mathematics departments) and for administrative uses. He said he felt that there were no unusual or unexpected problems because they had spent two years planning for it and that "they had done their homework" right. With regards to his initial plan of requesting a visit from the Inspectorate, he said that he would call them in only when something was "wrong".

According to the Headteacher, the key factor in introducing the use of computers into the school was that there was a combination of the following ingredients :

National Interest in the Use of Computers in Schools + Education Authority Interest + Human Interest

This, in his view, meant that schools "had" to take an interest in this new development/innovation. He said he felt that this was the only area in curriculum innovation where the school's innovation was a response to a national awareness, and not a scholastic push (not forgetting, according to him, the push from the children themselves who might possess their own computers). As he remarked, "You just can't ignore it". An apprehension that the Headteacher said he felt was that other teachers might feel that they need not get involved with using computers as they perceived that a number of their colleagues were now already interested in or using computers.

As he commented, his immediate future plans were to keep his objectives clear, to carry on with what he had been doing, and to carry on encouraging the use of computers in administration. According to him, his next aim would be to encourage the extensive use of wordprocessors, especially in the Business Studies department.

The Headteacher had also recently appointed (due to the departure of Mr. Bohr) a new head for the Computer Studies department, with a much wider brief as compared to the previous head of department. In the Headteacher's view, one of the aims for the new department head was to provide a right ethos for the use of computers in the entire school and that the computers should be used by all interested teachers and not to be confined to just one department.

Teachers' Reactions to the Headteacher's Strategy - They were mainly concerned in three specific areas :

1. **School Policy.** Teachers said they felt that initially, there was a major lack of coordination with regards to policies in the use of computers in the school. According to them, there was a no

overall plan as to where the school as a whole was going with respect to computers, and how each individual department fitted into that plan. They also said they felt that present school policy was quite "bitty or piecemeal", and that there was not a standard policy, for example, a guideline in purchasing similar or compatible disc drives. Others however said they believed that the school policy had helped because it had provided a computer room with BBC machines and the introduction of a Computer Studies course into the school. They said they perceived that present school policy was one of commitment to using computers and that the school would support specific applications from departments for specific projects.

2. **Appointment of new Computer Studies Head.** Teachers said they believed that the recent appointment of a new Computer Studies head to not only head the Computer Studies department but also to coordinate and oversee the whole range of computer-related activities in the school was a very positive step.

3. **School Capitation.** Teachers (especially heads of departments) said they felt that the school capitation which comes into the department on a yearly basis meant that departments could not buy all of the capital equipment they needed at one time. In other words, the annual department's budget was not sufficient for a capital investment in a coordinated computer system (including disc drives, printers, large-size monitors, and software) throughout the entire department and school, and that the computer system had to be built up piecemeal through a period of several years.

9.3 OTHER COMPUTER ACTIVITIES

Since the initial large purchase of the seventeen BBC computers, there had been no further purchases of computers. Various departments however had made attempts or were attempting to upgrade their computer system so as to be of more use in the department. This was described in detail in the previous sections. These attempts had been mainly done through the individual initiatives of the five various heads of departments and the Head of Physics, and often

meant a pooling of funds from the departments' capitation or a joint representation to the Headteacher for funds. It was only during the '83/'84 academic year that actual use began to increase, but this was more on the administrative uses of the computer rather than in Computer Assisted Learning.

Besides the five departments mentioned previously, other departments which had begun upgrading their computer systems included the Computer Studies department. The Computer Studies department upgraded one of their BBC computers to a disc version with a twin disc drive which had been donated by one of the parents of the pupils in the school. This computer system was used primarily for the Computer Studies department pupils to do their project work. A certain amount of record keeping of pupil data was also done by the Head of Computer Studies on this system. A wordprocessing package was also obtained by the Head of Computer Studies and was used by the department for pupils' report writing etc. For the academic year '83/'84, the Head of Computer Studies/Physics did not continue with his computer orientation course but individual teachers were encouraged to borrow a computer during the school holidays to familiarize themselves with it (as was the practice in the previous year).

The computers in the computer room had also been used as part of the school's Gifted Children's programme where a series of three to four lessons (of an hour each) in an academic year were devoted to computer programming. This course was given by the Head of Physics/Computer Studies. In addition, the Home Economics Department were also still using the computers in the Computer Studies computer room for one lesson per class per year for their 3rd years on the nutrition program DIET.

The Head of Geography began to take a more active role when the BBC computers arrived in the school. He was one of the heads that initiated the idea of a working computer system (consisting of a dot-matrix Epson printer and a single disc drive) for administrative uses by any member of staff in the school, and was able to pursuade the Headteacher to provide the necessary funds. As mentioned before, the Head of Geography had developed a general

purpose database program which could be used for pupil records etc., and promoted the administrative uses of the computer vigorously. He wanted to and was able to spend more time with individual teachers, explaining how to use the computer and the administrative programs.

The Geography department's computer system was also made available for the office staff to gain "hands-on" experience of the use of computers in the office (especially with respect to wordprocessing). The whole system was placed on a trolley and placed in the school office for a few days. This provided an opportunity for them to try out the wordprocessing facilities of the computer and to see whether it was suitable for their use. However, little interest was shown because, as the Head of Geography remarked, "of political reasons", which, according to Mr. Coleridge meant that the office staff were not prepared to learn a new skill without being paid for it and without proper training courses organised for them. They were cooperative however in helping to type some of the pupils' records into the computer for use with the database program.

Other new individual users over the past one and a half years included one teacher who was using the computer system based in the Geography department for storing the results of the cognitive tests made to all 2nd year pupils in the school. This was a standardised test, the results of which was used in the grouping of the pupils in large bands in their third year. Several Heads of Houses also came for an introduction course given by the Head of Geography on how to use the computer with the database program. They were considering how best they could use the computer to ease the administrative workload that they carried as Heads of Houses.

Future Use - The future plans of the school, with respect to the use of computers, was to upgrade their existing computers to run on a network system where all the twelve computers in the Computer Studies computer room would be linked together and controlled by a master computer with one twin disc drive and a single printer. One advantage of this system would be the increased speed of loading programs into each computer at will. Although funds had already been set aside (from school funds) and the order made for the upgrade in September '83, the

County authorities had not taken any action and this had frustrated a number of the staff in the school. The school was also waiting for the arrival of a colour monitor and a printer which was bought under the Department of Industry's (DOI) upgrade scheme. Again, according to Mr. Bohr, the County had been delaying this. One of the initial reasons given was that the monitor recommended by the DOI did not meet the safety standards of the County for school equipment.

Other uses in mind included the use of the wordprocessing facility and the use of adventure programs for the gifted children's group; the purchase of suitable software on discs for the Intensive Training Unit (ITU); and also the starting of the Pittman's and/or RSA course for using wordprocessors in the Business Studies Department.

PART THREE CHAPTER 10 : CRITICAL SUMMARY OF THE RESULTS

10.0 INTRODUCTION

This chapter draws together the results of the main analysis chapters (5-9), looks critically at the research findings and then discusses the interplay of the various factors, at different levels, that have affected the actual use of computers in the five departments in the school and thereby attempts to sketch some answers to the research questions asked in Chapter 3. Lundgren's Frame Factor Theory is used in this discussion as it provides a framework which indicates the different kinds of factors that may be involved in any form of curriculum innovation, within the three levels of the teaching, school and educational system units.

As the data collected was not only about the organisation of departments and schools, but also about teachers' views and opinions towards computers, it was decided to extend Lundgren's Frame Factor theory by introducing a new system into it to include the description of the teachers' attitudes towards the innovation (which will be referred to as the Attitude System). Thus, the four systems that will be used in this discussion are :

1. The Attitude System. This system takes into account the attitudes and perceptions of teachers. In this study, it is firstly, the views and opinions of teachers towards audio-visual aids and secondly, towards computers in general, in teaching, and in administration that are considered. This was discussed in great detail in Chapters 5 and 6 respectively.

2. The Frame System (Organisational Constraints and Solutions). This system, based on the organisational profiles of the teachers, is on the pragmatic organisational problems encountered as well as the solutions envisaged by the teachers, heads of departments and headteacher in introducing the use of computers. This includes firstly, the collective problems associated with factors like time, class size and level, use, and resources (as organisational constraints are bound to be shared by everyone); and some of the collective solutions suggested by some of the teachers as to how these problems could be minimised, overcome or

solved. Some of the teachers were able to see organisational problems but could offer no solutions, while a few were able to envisage some solutions while not explicitly stating the organisational problems that they were suggesting solutions for. These factors within the frame system are mainly organisational constraints (-) or organisational solutions (+). This was discussed in detail in Chapters 7 and 8.

3. The Formal-Rule System (Strategies and Politics). This system, according to Lundgren, is of a regulatory nature, i.e. it is those factors of a legislative nature, written and unwritten, that concern the duties of a teacher. Within the level of the school, the strategies of the department heads and headteacher (and the reactions of the teachers to these strategies) would have a regulatory effect on the introduction of computers into the department and school. This was discussed in Chapters 7 and 8 .

4. The Goal System (Curriculum). This is the system that takes into consideration all the factors that are a consequence of the type of curriculum being used, for example, examination orientated syllabus. This was discussed in Chapter 8.

In Lundgren's analysis, mention was also made that these systems operated on three different levels or units (of teaching, school and educational system) and this is diagramatically represented in Figure 10.1. In this research study, the two main levels that were examined were the teaching level (which includes the teachers and the departments), and the school level.

As was previously described, the comparison of the strategies and leadership styles of the heads of departments was based on the set of categories formulated by White and Lippitt (1968) on leader behaviour and member reaction. In this research study, the leadership styles were categorised under the three leadership styles of autocratic, democratic and laissez-faire which was elaborated in Chapters 7 and 8 . Finally, in this discussion, teachers' perceptions of the use of computers at the different levels of department and school are represented as driving or opposing forces using Lewin's (1952) Force Field representations. Lewin's force field representations make it possible to show, dynamically, the magnitude and direction of these

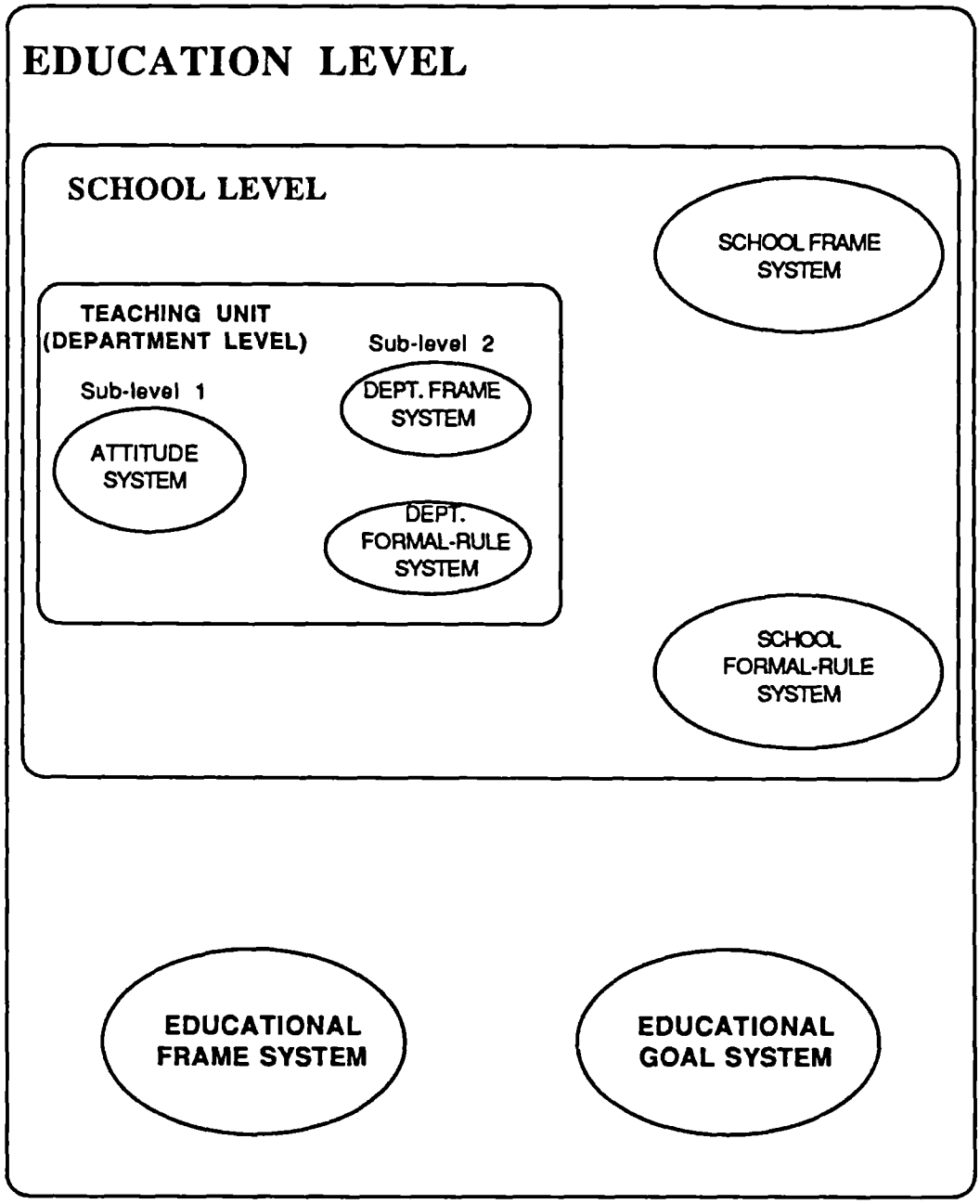


Figure 10.1 Adaptation of Lundgren's Systems

factors of change. A modification of Lewin's representation is to provide a scale at the bottom of the diagram to show the magnitude of movement, i.e. to show the increase (or decrease) of usage of computers (but only very qualitatively) over the one and a half year period that the use of computers was monitored in Barnaby Comprehensive. No attempt is made at all to measure the quantitative uptake of computers or to represent these in Lewins' force field diagrams. What is represented are relative changes in the use, or non-use, of computers within the departments and school.

10.1 THE ATTITUDE SYSTEM

10.1.1 Teaching Methods and Resources

At the level of the teacher, it was important to discover whether teachers in the History, Geography, Science and Mathematics departments spontaneously mentioned the use of computers in their teaching without being directly asked about them. In addition, it was essential to understand teachers' views about computers and the use of computers in teaching, and to see whether they saw computers as only a teaching aid/resource (as equipment to be used in class, i.e. educational technology), or whether they saw computers as more than that. Thus in Chapter 5, a preliminary enquiry (via a questionnaire) as to the teaching resources/aids and teaching methods that teachers would have liked to use (i.e. given a situation of no constraints, an Ideal World) as compared with what they actually used in their everyday work (i.e. in the Real Situation or Real World) was described and analysed. In this way, an attempt was made to understand what and why certain resources and methods were used and others were not.

What emerged was that there was a difference in the nature of the resources that were suggested between the two situations of ideal and real worlds. For example, the teaching resources that teachers used in their teaching were resources that were technically less complex, where there was a minimum amount of preparation required, and where the teachers' main role would be as the sole imparter of knowledge. Thus, it was not surprising that the use of the OHP, blackboard and textbooks were the main teaching resources mentioned. Similarly, it

was found that the reasons teachers gave for the types of teaching methods they wanted to use, in a situation where there were no constraints, were mainly pupil dominated. They wanted to use these methods as they perceived that it would help their pupils in the learning of the various subjects. However, in their normal teaching activity, the teaching methods that teachers used were different, and the reasons given were mainly constraint reasons, personal as well as organisational constraints. This gap between what was used and what was hoped for grew wider from the History to the Geography to the Science departments, and became more so in the Mathematics department where teachers could not perceive of using teaching methods where there were no constraints at all. Already it was found, at even the initial stages of the research, that there was a wide difference in the reasons for using various teaching styles and methods in the departments of the school.

There was generally a very low level of awareness amongst teachers about computers, especially the use of computers in teaching, even in a situation where there were no constraints. This was brought out by the fact that when teachers were asked about what teaching resources and methods they would use in a situation of no constraints (described in Chapter 5), only five teachers mentioned the use of computers. The only real uses made were in simple wordprocessing, and with a single teacher using the computers once a year for her class. Furthermore, it was recognised that without a conscious prompting from the researcher, the teachers could not imagine a situation where computers would play an important part in their teaching and in the school.

10.1.2 Teachers' Perceptions About Computers

Some of the research conducted in the area of CAL merely tried to relate teachers' attitudes towards computers to biographical factors or past experience (Bolton and Mosow, 1981; Christopher, 1969; and Robardey, 1971). This research study attempted to discover in greater detail what teachers specifically thought about computers and the use of them in teaching. It became apparent that teachers made a distinction between how the saw computers in general (in society and in industry), and how they saw the use of computers in teaching and in

administration. The teachers at Barnaby Comprehensive not only showed favourable or negative views towards computers, as was also shown by teachers in other studies (Bolton and Mosow, 1981; Robardey, 1987; Stevens, 1980; Stimmel et al, 1981; and Wayth, 1981), but there was in effect a whole range of views covering an extremely broad spectrum of attitudes within the five departments of the school. The cluster of negative views such as Unfavourable, Antagonistic and Indifferent, were often associated with a negative view of themselves, i.e. a negative self-concept. For example, those who were apprehensive about using computers also saw themselves as "not-logical", "not-mathematical", "old", or "slow" (see the Teacher Profiles and Figure 6.5 of Chapter 6). On the other hand, those teachers with positive views about computers (even though there were worries and criticisms attached to these views) rarely talked about themselves or their self-concept. In addition, those who had favourable comments about themselves (seeing themselves as "scientific" or liking new areas of challenges), also saw computers as not beyond their capabilities .

Stimmel et al (1981) found that teachers' views about computers were "oppressive". Such views were expressed by a number of teachers in Barnaby Comprehensive who, while having positive views about computers in general, also had quite deeply-rooted worries or criticisms about computers and were concerned with the possible abuse of power which might arise as a result of the use of computers in society. Could this, as some of the comments by teachers reflected, be due to the perceived capabilities of computers in storing and accessing large quantities of personal data ? Some of Wayth's (1981) sample of seven teachers, for example, were apprehensive due to a lack of understanding as to the capabilities and uses of the computer. In Barnaby Comprehensive, some of the teachers also had feelings of inadequacy arising out of an ignorance of computers or the terminology used to describe computers. Others, however, were fascinated, impressed and interested about the capabilities of computers, seeing computers as an important and useful tool and a growing influence in education. It seems that for some teachers, the capabilities and "power" of the computers could be awe inspiring leading to a fascination with computers, while others felt very much threatened by them.

This range of views about computers was narrower when it came to analysing the perceptions teachers held about computers in teaching. Stevens (1980) for example, found that over 46% of his sample of teachers were undecided or did not believe computers would enhance learning. Also, all of the teachers in Barnaby Comprehensive had reservations about the use of computers when it came to using them in their teaching because of genuine worries or criticisms about how computers could be used. Some teachers at Barnaby Comprehensive saw computers in teaching as affording quick and dynamic visual displays for difficult concepts, as statistical tools, and as a means for reinforcing learning through the visual medium. Individual learning could also be promoted. However, they had reservations about the danger of computers being used solely for games-playing. Likewise there could be the danger of only the brighter pupils using computers with the less-abled ones loosing out. Linked with this is the problem of infrequency of use. As numbers in the study were small, it was not possible, in contrast to Beck (1979), to see any clear pattern in the perceptions of male and female teachers towards the use of computers. However, both male and female teachers exhibited a wide range of opinions.

When the teachers' perceptions about computers in teaching were examined more closely, this revealed a number of worries at different levels. It became clear, for example, that the teachers at Barnaby Comprehensive perceived changes in their role as one of the critical issues with the onset of the use of computers. Teachers in the five departments in Barnaby Comprehensive perceived that there would be changes in themselves as an authority (i.e. being competent), changes in themselves being in authority (i.e. being in control and confident in the classroom), and changes in their teaching situation. Such issues were mentioned by Anderson et al (1979), Elder et al (1982), the ITMA team (Fraser et al, 1983; Phillips et al, 1983; and Ridgway et al, 1983), and Sheingold et al (1983) who highlighted the fact that teachers were concerned with how they would manage the use of computers in the classroom.

Teachers perceived that the use of computers would require them to be seen as an expert in the use of computers and that they would need to acquire expertise in a new and unfamiliar field in which, it might be added, some pupils were already proficient. One of the conclusions made

by Elder et al (1982) was that teachers felt that the amount of competence required to use the computer was minimal, but that the real issue was acquiring the necessary confidence. At Barnaby Comprehensive, the teachers seemed to express more of an interaction between the issue of confidence and competence, with many of them expressing a lack of self-confidence as revealed through their own comments about themselves (i.e. how they saw themselves, their self-concept), and/or comparing themselves with their pupils, together with the need to acquire the necessary knowledge and skills.

Hence, as Anderson et al (1979), Stevens (1980) and Sheingold et al (1983) had found, adequate training prior to use was an important element. More importantly however, at Barnaby Comprehensive, this was not sufficient. Quite often, issues of being in authority were disguised by the teachers, and so many teachers had put forward, for example, the problems of computers being damaged, broken or stolen. It became clear that such comments were expressing an anxiety about classroom control and management, and the role that pupils would see the teacher as having in classes where computers were being used. Such feelings of "not being in charge" together with earlier feelings of "not knowing about computers", combined with feelings of "not being logical or mathematical" created in many of the teachers at Barnaby Comprehensive a real apprehension about using computers. In this study, teachers could be seen to be asking for help at a number of levels, including the very basic but essential skills of classroom management and control when using computers. Another issue which both Elder et al and this study found was that teachers were more concerned about the security and safety of the computers, without mentioning the safety of their pupils who were using equipment that might be electrically dangerous.

Another pattern that emerged (see Figure 6.5) was that the majority of those teachers who talked about their problems with teaching (even when not using computers), were also concerned with such issues as classroom management when computers were to be introduced. They were the same teachers who expressed their struggles and difficulties concerning their job or admitted that they were "traditional" in their way of teaching, and were also worried that pupils might damage the computers. In addition, they were worried as to how

they would be able to change or adapt their way of teaching if they had to incorporate the use of computers.

A further relationship that could be seen was that those teachers who expressed fears that their traditional roles (for example, as an imparter of knowledge) might be challenged, also expressed the fear that this change of roles might necessitate changes in the composition and size of the classes. This would, in turn, require a change in the amount of computer facilities and technical back-up required and, it could be speculated, ultimately lead to a change in the organisation of the school. This was also reflected in the studies by Alderman and Mahler (1976) who found that although teachers at the tertiary level said that they were open to innovation they wanted to preserve their autonomy in any curriculum decisions or in establishing and testing their own instruction, i.e. they were afraid that their traditional roles would be challenged. The research carried out by the ITMA team (Phillips et al, 1983; Ridgway et al, 1983; Fraser et al, 1983) largely recognised the fact that teachers' roles in the classroom would change and thus explored the various ways in which these different roles and methods of teaching could affect the activity and learning processes in the classroom. The teachers who were asked to participate in the ITMA studies were enthusiastic teachers, or at least teachers who were prepared to attempt these various teaching styles.

Finally, with respect to the use of computers in administration, it was more black or white. Teachers were either favourable or antagonistic towards the use of computers, seeing them as either useful as databases and wordprocessing tools (i.e. for pupil records, documentation etc.) or as being unable to do the demanding job of options work. Wayth (1981) mentioned that the teachers in his study had seen the positive aspects of using computers in administration, but did not mention any negative views.

10.2 THE DEPARTMENT FORMAL-RULE AND FRAME SYSTEMS

This research attempts to stress the fact that while it is crucial to understand the different viewpoints of teachers, it is necessary to realise that teachers are within the organisational

setting of a school, and that schools have heads of department who are decision and policy makers and who, either directly or indirectly, affect the implementation of an innovation within a school (i.e what Lundgren terms as the The Formal-Rule System).

Sheingold et al's (1983) study showed (and mentioned in passing by Anderson et al, 1979; and Pengov, 1977) that it was necessary to go beyond the personal perceptions of teachers, about themselves and the use of computers, to consider the organisational constraints or solutions (i.e. the Frame System), that teachers perceived when using computers. In addition, most of the research studies conducted so far (especially the questionnaire/survey types of Alderman and Mahler, 1976; Anderson et al, 1979; Bolton and Mosow, 1981; Pengov, 1977; Robardey, 1971; Stevens, 1980; and Stimmel et al, 1981) looked at the teachers' attitudes either at one particular point in time or over a short period of time (before and after a CAI lesson). An important issue that was addressed in this research study was whether attitudes of teachers and/or leadership styles of heads of departments at Barnaby Comprehensive changed during the course of time.

Within the school, the five departments exhibited different styles of leadership, with the Science and Business Studies departments revealing a democratic leadership style, the History and Mathematics departments an autocratic style, and the Geography department with a laissez-faire style of leadership. Embedded within these leadership styles were the different strategies adopted by the department heads with their different models of change (although to some heads of departments these models might have been implicit rather than explicit).

At the outset, it might have been hypothesised that a democratic as opposed to an autocratic leadership style might lead to a greater uptake of computers. Two departments, the History and Science departments, could be contrasted in this respect. The Science department had a democratic style of leadership which was thus hypothesised to lead to more cooperation between teachers and head of department, and so after one and a half years, the Science department might have made rapid progress. At Barnaby Comprehensive, the teachers in the Science department had the most favourable attitudes towards the use of computers although

with reservations. In addition, the head of department's strategy was for encouraging teachers in the department to use computers. This contrasted with the leadership style of the History department which was an autocratic style, and it might be expected that the antagonism experienced by the teachers as a result of this style would lead to a rejection of the use of computers in the department. There was also a mixture of favourable and unfavourable attitudes towards computers by teachers in the History department.

In both departments, teachers saw organisational constraints hindering the use of computers in their teaching. For the Science department, there was a major force against computer use as a result of department organisational constraints of time, resources and class size and level (as discussed in Chapter 7), and for the History department, the main organisational constraint was that of time. Both these departments saw the constraint of time for training and using computers as a common factor which could only be solved at the organisational level of the school.

When these two departments were compared one and a half years later, the actual uptake of computers was different from that initially envisaged (Figures 10.2 and 10.3). There was a relatively larger increase in the use of computers in the History department than in the Science department, over the one and a half years. This could be interpreted as the result of the dominant role of the head of department which gradually turned to a more democratic style of leadership, who through this means took the burden of decision-making in an area unknown to his staff. Thus the autocratic leadership style served as a positive force when needed, inspite of opposition. This style of leadership switched to a democratic leadership style. For example, teachers felt that their head of department was informing them more of his ideas about the use of computers in the department which thus provided a continued positive force towards the use of computers in that department. This is compared to the Science department which, although starting with an extremely positive attitude system and a department head who initially had a favourable policy towards the use of computers, had a smaller uptake of computers. This could be because the head of Science did not feel that he should be taking a leading role in the use of computers and so there was no real follow-up strategy or subsequent department policy to

get individual teachers "off the ground". As a result, teachers in the Science department were left to themselves to do as much or as little as they could in using computers.

It might be hypothesised that the attitude system would be all important in determining the uptake of computers, and this may be the case in the short term. However it would seem that for the long term, additional positive forces such as "strong leadership" (i.e. the formal-rule system) are more important determinants. So, for example, the History department provided a model of how the dominant leadership style and strategy of the department head could play a part in the introduction of computers to a department. Two major changes of forces had occurred over the one and a half year period in the History department. Firstly, there was a change of attitudes by all three teachers. A reason for this change of attitudes could be the fact that the strong leadership style of the head of department "directed" the teachers to consider the use of computers. Once they saw how computers could help them, especially in administration, their attitudes gradually altered. The other major change was that the leadership style of the head of department had also altered to a more democratic style, informing and encouraging teachers in the use of the department computer (which they now, after one and a half years, perceived as easily accessible). This change of leadership style was seen to be necessary if sustained computer uptake was to take place in the department. It could also be hypothesised that this change of leadership style was necessary so that the earlier feelings of antagonism experienced by the teachers as a result of the initial autocratic leadership style of the head of department would not become a continued and major force against the use of computers within the department in the long term.

The Science department, on the other hand, provided a model whereby the sustained positive attitudes of teachers led to an initial uptake of computers, inspite of organisational discouragements (the frame system), but that this uptake of computers drastically slowed down or even stopped without a strong department policy to provide guidance and encouragement for the further use of computers. The uptake of computers was small and this was despite the fact that after one and a half years, the teachers were still positive towards the use of computers

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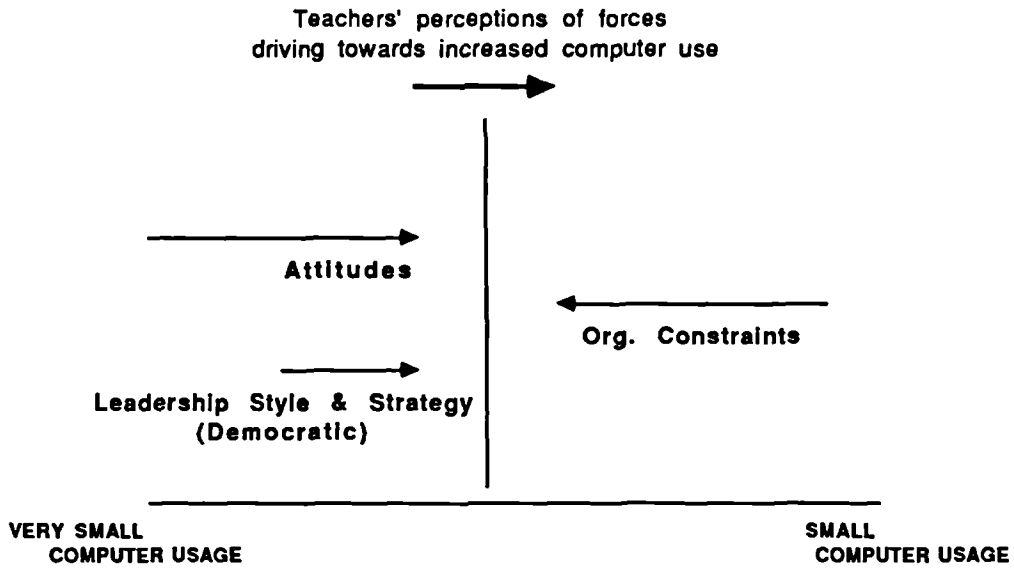

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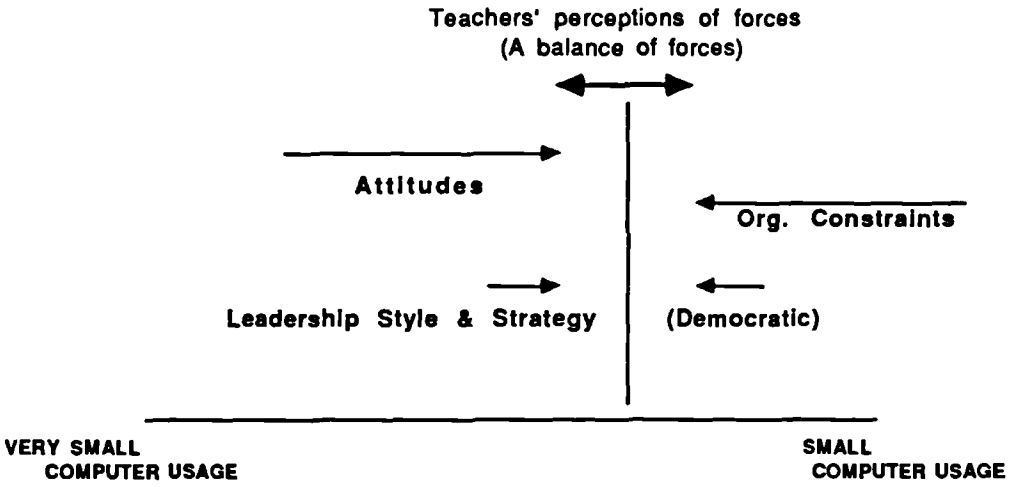

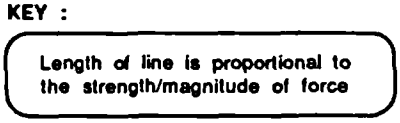

Figure 10.2 Force Field diagrams for the Science Department over the one and a half year interval.

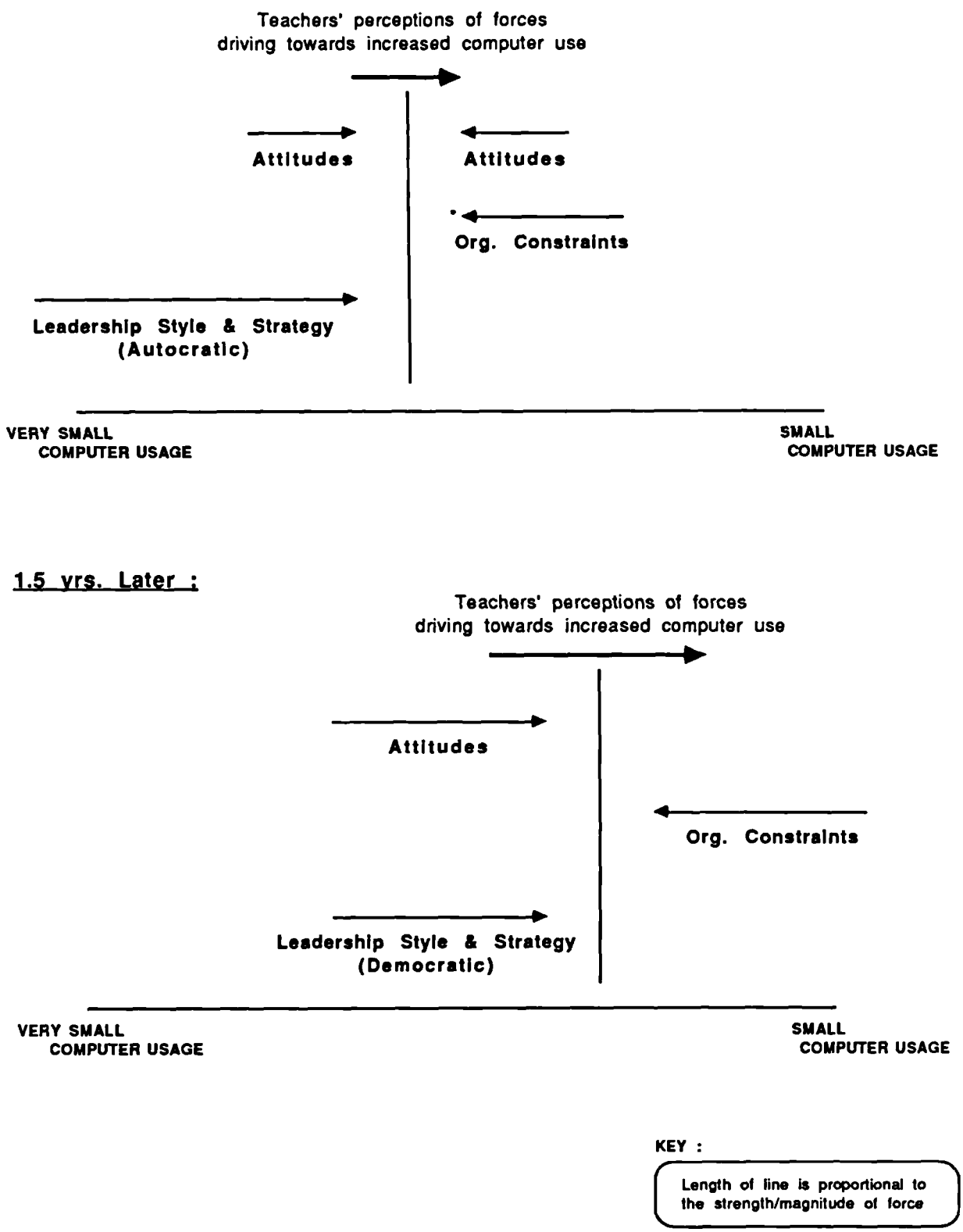

Figure 10.3 Force Field diagrams for the History Department over the one and a half year interval.

in teaching and that they were now aware of new organisational solutions regarding the availability and accessibility of the department's computer.

It could be postulated that for the next few years there would not be a great difference in the use of computers in the Science department, unless new forces come into play, for example a stronger leadership style or more computer resources being allocated to the department. On the other hand, for the History department, it could be postulated that the changes of attitudes and leadership style would continue to provide a resultant force driving towards increased computer use, and hence one would expect that there would still be a gradual increase in computer usage in the next few months or years, provided no change or new forces come into play which might oppose those forces.

Turning now to the Geography department, which in many ways did not resemble the other two departments just discussed, it might be hypothesised that the uptake of computers in this department would be minimal since there was neither a strong leadership style nor a positive attitude system. The Geography department provided a situation where there were the various conflicting forces of the attitude, frame and formal-rule systems within a single department (Figure 10.4). As in the History department, there was a mixture of both positive and negative views towards computers by teachers, although in the Geography department, the positive attitudes were more dominant. There was also the negative frame system (which in this department was the main organisational constraints of time and class size and level) which provided another force against the uptake of computers. The lassiez-faire leadership style of the department head meant that the pattern of innovation diffusion was unsystematic and unplanned. So while the leadership style might be seen to be neutral, it seemed to be positive because, it could be hypothesised, that the help and guidance provided by the head of department, which if accepted, became a positive force which altered teachers' attitudes towards using computers. This in fact compelled the department into a fairly substantial uptake of computers (comparable to that of the History department). For example, one of the most dramatic changes was by a teacher in the Geography department (Mr. Hugo) who was initially antagonistic towards the use of computers but whose attitudes radically changed in the area of

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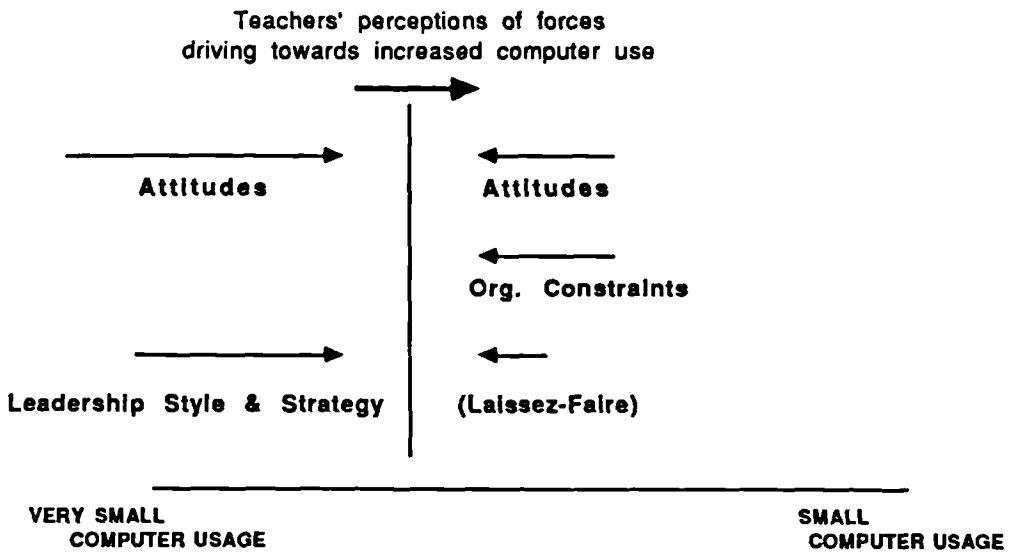

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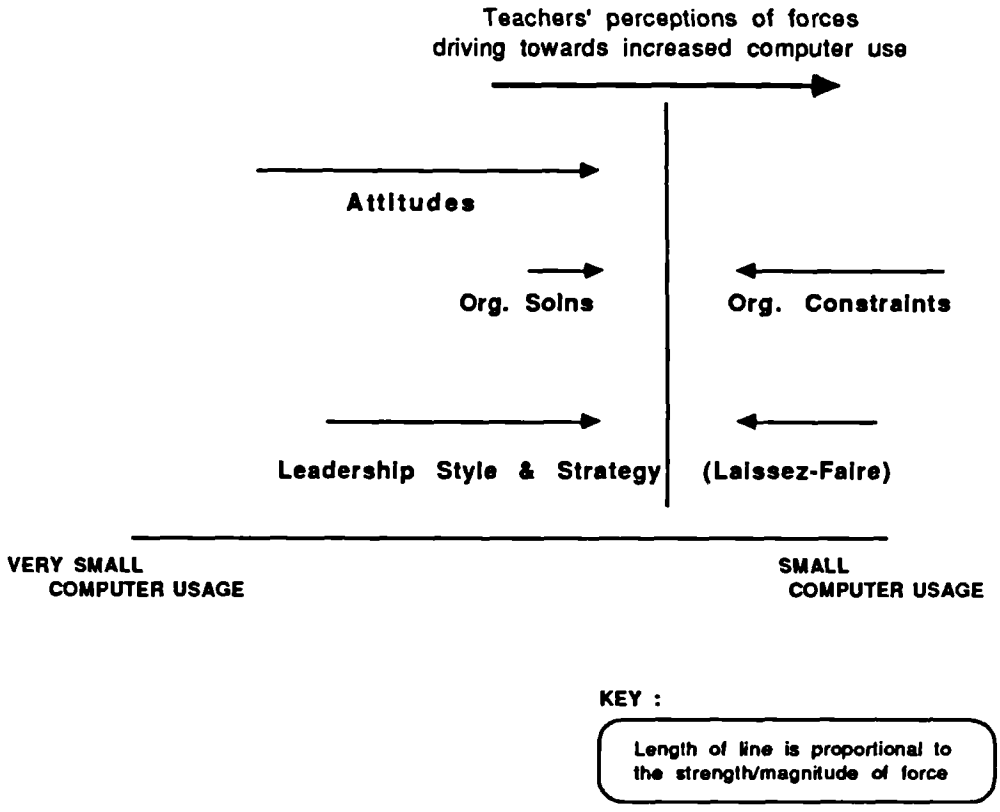

Figure 10.4 Force Field diagrams for the Geography Department over the one and a half year interval.

the use of computers in administration as a result of the help provided by the enthusiastic head of department. So in this department, these keen and enthusiastic teachers (Mr. Bohr and Mr. Coleridge) who made themselves available to help others at any time and to build the confidence of others in the use of computers at the expense of their own personal time and energies, played a very important role. This was similar to the findings of both Sheingold et al (1983) in their analysis of their third educational authority and of Pengov (1977), who found that the involvement of potential adopters was greatly affected by the enthusiasm of keen teachers.

The leadership style of the head of department could perhaps be reinterpreted in the long term as looking more like a democratic style of leadership, given that he was always around, available and cooperative, allowing teachers the freedom to choose. This positive formal-rule system also led to a change in the frame system as teachers felt that the department was now trying to put in additional resources, for example additional finance, to encourage and help in the use of computers.

The Mathematics department was comparable to the History department in as much as it had a similar formal-rule system (i.e. an autocratic style of leadership) and frame system against the use of computers (Figure 10.5). Teachers in the Mathematics department perceived the lack of time and insufficient resources as the main organisational constraints. Computers were not regarded as one of their main priorities. In addition, the head of Mathematics did not inform his staff members of his intentions and plans for the use of the BBC computer in the department. Teachers said they regretted that guidance from their department head was not forthcoming. Finally, the attitude system of the teachers in the Mathematics department was very negative as teachers were either unfavourable or antagonistic towards the use of computers, or were completely unaware of the potential uses of computers in teaching. In this instance however, the autocratic leadership style was not a force towards the uptake of computers (as was the case in the History department) and the negative attitude system and frame system thus led to no real uptake of computers at the beginning.

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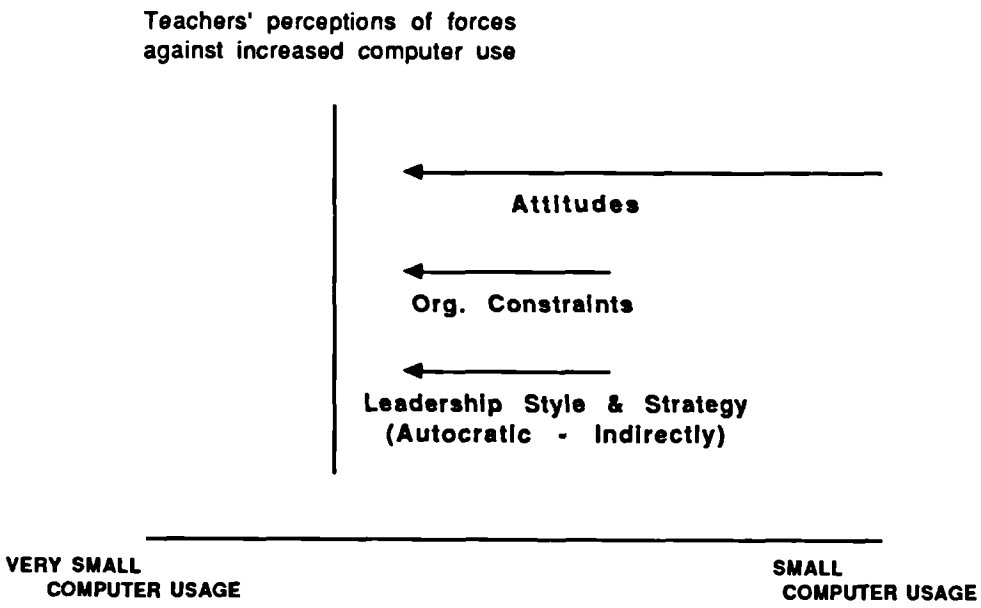

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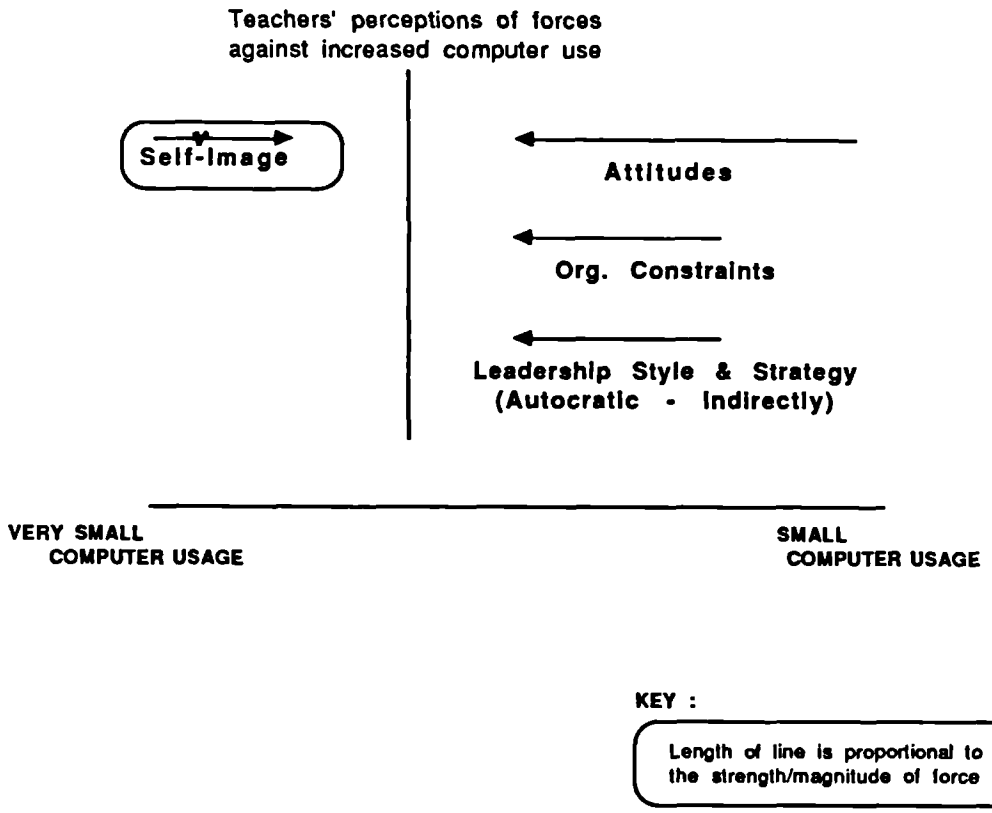


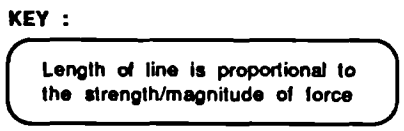
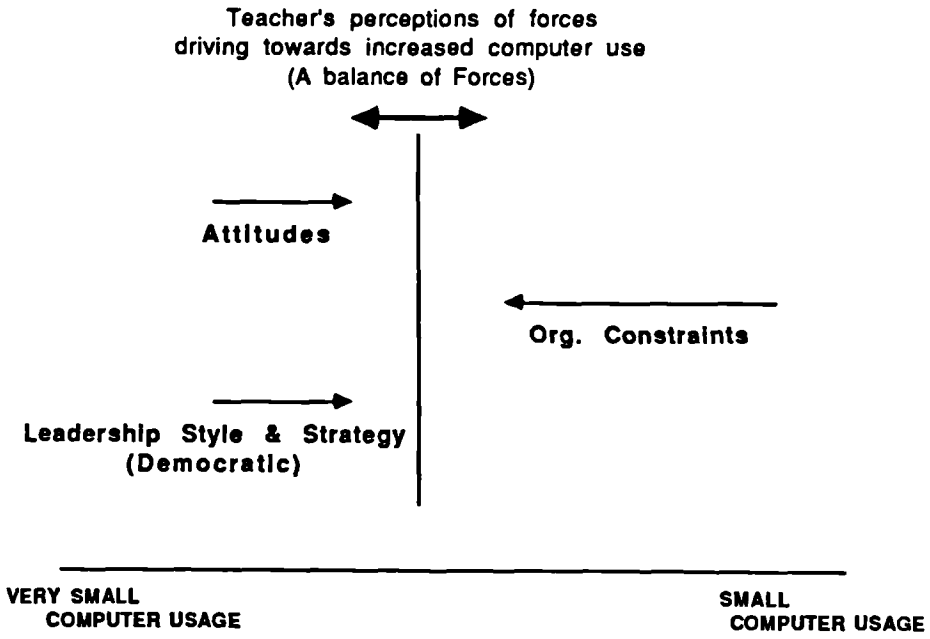


Figure 10.5 Force Field diagrams for the Mathematics Department over the one and a half year interval.

It might be predicted that in the Mathematics department there would not be any uptake of computers, even after one and a half years. This was not the case however as there appeared to have been a subtle and stronger force intervening in the Mathematics department during that period. This intervening force, it could be hypothesised, was that mathematics teachers became aware that they needed to be seen by society to be knowledeagble in the use of computers, i.e. they became concerned about their self-image. Present-day teachers of mathematics felt that modern mathematicians should be using computers in their teaching and that it was only the old-fashioned ones that did not use them in the classroom. This was reflected by the Mathematics teachers' comments that they believed that society would require their pupils to know about computers which thus required them as Mathematics teachers to be able to fulfill that role. This subtle force thus brought about a slight increase in the uptake of computers one and a half years later. This was mainly as a result of individual teachers in the department, and not as a result of the leadership style or policy decisions of the head of department (as was the case in the History department), or the keeness of the head of department (as was the case in the Geography department).

Very little can be said about the Business Studies as a departmental organisation because only one person was interviewed. However, the comments and experience of that teacher provide an additional insight into the use of computers in the department and school (Figure 10.6). The head of department himself admitted that he was not competent with computers and so his positive democratic leadership style and attitudes were obstructed by this lack of computer knowledge, which resulted in a lack of clear policies and strategy for the implementation of computers within the department. This, together with the negative force of the frame system in the Business Studies department (i.e. the perceived organisational constraints, especially of unexpected costs) led to no real uptake of computers in the department. Even with positive attitudes, there could be no real progress in the use of computers in the department if there was no clear strategy to provide a force strong enough to overcome the organisational constraints in using computers in the department.

Baseline :



1.5 yrs. Later :

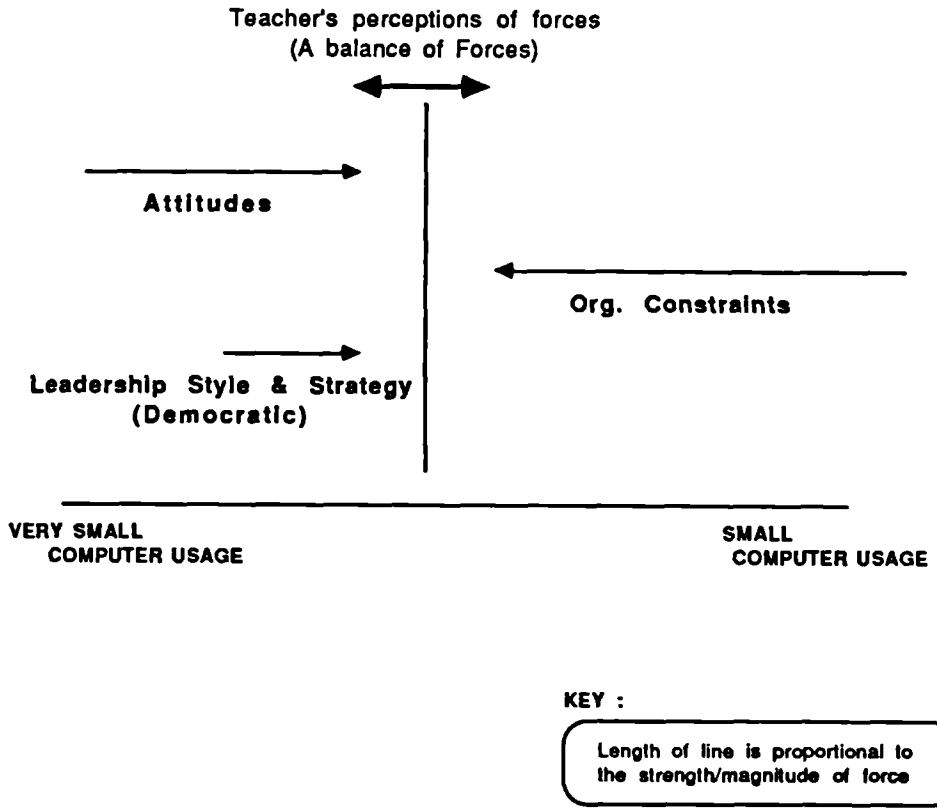


Figure 10.6 Force Field diagrams for the Business Studies Department (perception of one teacher) over the one and a half year interval.

Lastly, concerning the inter-relationship between the frame system (organisational constraints and solutions) and the other two systems, it could be seen that the frame system had an important effect on teachers' attitudes. For example, the organisational factor of time played an important role both at the beginning and during the whole period of the study for all the teachers in the departments. Time, while looking like a simple organisational constraint, could be hypothesised to play a much more crucial role. Teachers who had a negative self-image of themselves or felt incompetent in using computers saw time as very necessary to acquire the necessary knowledge and skills to use computers in a classroom situation. They needed time to be trained in the use of computers, time to use computers in their teaching itself, and for some, time to look at software or to develop suitable software for their own use.

Another major organisational constraint which was reinforced during the one and a half years was the teachers' perceptions of resources and finance available for the use of computers. Teachers initially felt, for example, that there were not enough computers available to encourage them to use computers more frequently. With the passage of time, teachers began to realise not only the insufficient number of computers available, but also the limitations of equipment that they had and the need for additional resources if they were to achieve their intended use of computers. For example, teachers in Barnaby Comprehensive soon realised that extra computer memory and extra money (for the purchase of disc drives or printers) was needed which had not been budgeted for. They felt that this was due to a lack of foresight on their part for not requesting sufficient finance in the first instance. There was also the new realisation that as progress was slow, there would be the possibility of the computer systems they were using becoming rapidly obsolete. Initially, these resources were not acknowledged by the teachers simply because, it could be hypothesised, there was not enough computer awareness by teachers at the beginning. As their awareness of the use of computers grew, even though it was still very limited, their awareness of the lack of resources grew.

So it would look as though the attitude system interacts fairly significantly with the frame system as organisational constraints provide the boundaries wherein teachers develop their ideas, or change their attitudes about the use of computers in teaching. For example, due to the lack of

time and resources, teachers are unable to explore the different uses of the computer and to formulate views and opinions as to how computers could be used and managed in their classroom situations.

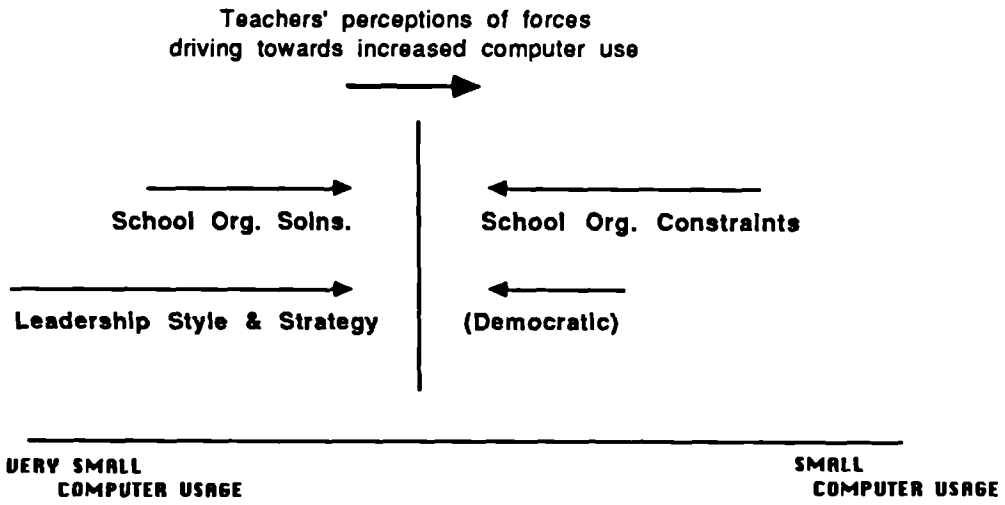
10.3 THE SCHOOL LEVEL

Just as it was crucial to look at the three systems (attitude, frame and formal-rule) of the various departments, and to see the effects that they have on the actual use of computers one and a half years later, it is equally important to look at these systems at the level of the school. Thus the systems examined at this level were the School Frame System (i.e. the organisational constraints and solutions at the school level), and the School Formal-Rule System (i.e. the leadership style and strategy of the Headteacher, and the reactions of the teachers to his style and strategy). In addition, the Goal System (i.e. the Curriculum) and the Frame System at the education system level is reflected in this discussion here as they impinge on the innovation of computers at the level of the school. These factors are not the only factors at the educational system level, but these were the factors perceived by the teachers as directly affecting their use of computers in the school.

At Barnaby Comprehensive, the leadership style of the Headteacher was seen to provide a major force towards the uptake of computers in the school (Figure 10.7). Teachers perceived the leadership style of the Headteacher to be democratic and thus helpful in the introduction of computers, although some felt that there was still insufficient direction given with respect to an overall policy (this is covered in greater detail in Chapter 8).

Some of the headteacher's strategies that were seen to be positive steps towards encouraging the use of computers in the school included the financial provision (50% subsidy) for the purchase of computers, and the formation of the Computer Studies department. Organisational constraints, however, were considered by teachers to be more dominant than the organisational solutions provided. Such organisational constraints included the lack of training, lack of time, lack of additional finance and resources, insufficient hardware and software, and

Baseline :



1.5 yrs. Later :

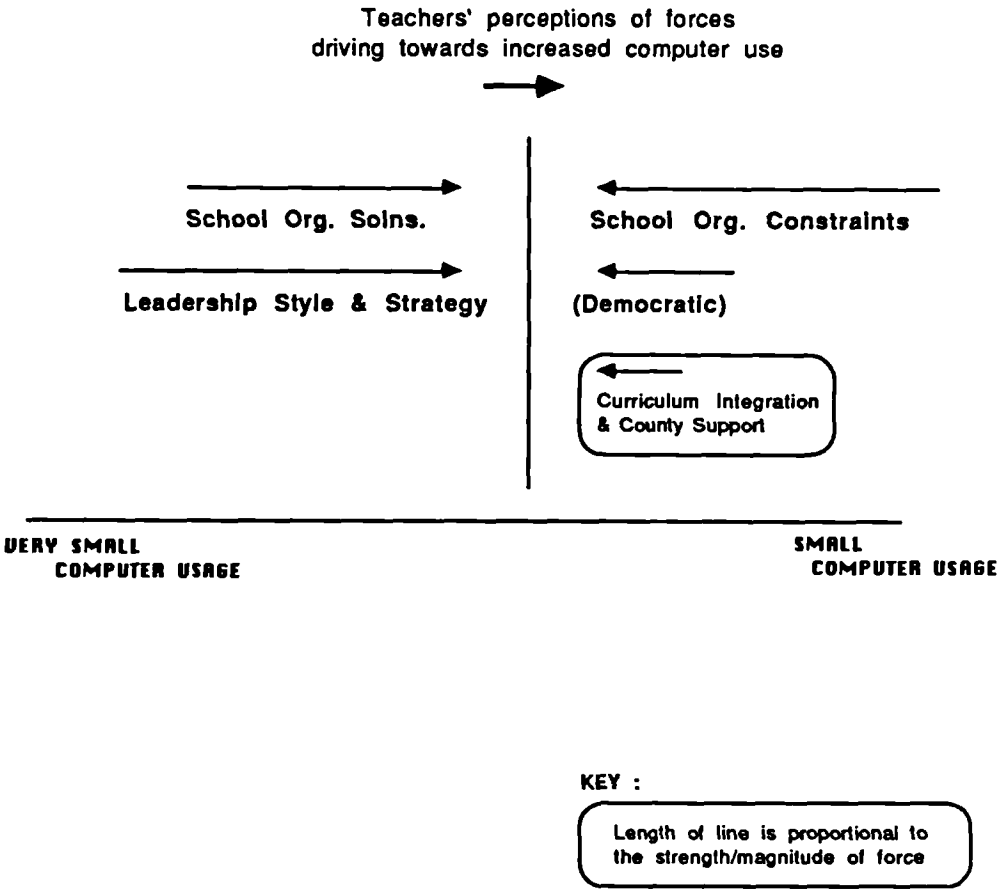


Figure 10.7 Force Field diagrams for Barnaby Comprehensive over the one and a half year interval.

inappropriate school timetabling. These were very similar to the research findings of Elder et al,1982 (time and timetabling); the ITMA team, Phillips et al, 1983; Ridgway et al, 1983; Fraser et al, 1983 (training, software and hardware); Pengov, 1977 (adequate computer resources prior to adoption); Sledge, 1981 (the provision of adequate and appropriate software); and Wayth, 1981 (hardware).

Inspite of these organisational constraints, the support provided by the Headteacher produced a large force which led to a gradual uptake of computers in the school over the one and a half year period. This uptake of computers was however mainly in the area of administration and not in teaching.

Additional forces, but this time at the educational system level, started to appear especially as teachers began to use computers in their teaching. For example, teachers were concerned with the issue of the curriculum, that is, the appropriate integration of computers into the curriculum, and the limiting nature of the examination syllabus which might have a dampening effect, or might even be a limiting factor, in the uptake of computers in the school. These forces could possibly become more acute if the use of computers in teaching were to increase. The research studies conducted by Elder et al (1982), Jones and O'Shea (1982) and Sheingold et al (1983) also hinted at this problem.

10.4 CONCLUSION

Looking back at the research questions in Chapter 3 and the discussion above, it can thus be seen, with respect to the first two questions, that teachers' self-concepts in relation to "things electro-mechanical and logical" played an important role in determining the teachers' views of themselves in actually using computers in their teaching. In other words, because they saw computers as requiring knowledge of a technical and mathematical nature, particularly when they knew little about computers, they began to have doubts about their own abilities, especially in adapting to the new situation of using computers in the classroom. This view of themselves was extremely crucial to the teaching situation since their defined role of "being an

imparter of knowledge" was to them challenged. They were no longer an authority in the area, and this also led them to feel that they could not cope with classes and so be in authority in the teaching situation.

At a more direct level, this idea of being competent in the area of computers was an important determinant in their attitude towards teaching with computers. Teachers felt that they should be entitled to acquire this competence, and that it is the school that should find the ways and means of providing time, training and resources for teachers to acquire the necessary computer skills. As a result of acquiring this computer expertise, teachers felt that they would be confident and in a better position to control the classroom where computers were being used, and to be competent in using computers in different ways and for different groups of pupils.

Even with a small group of fifteen teachers, there was a wide range of views and opinions towards computers in teaching, and these too were "qualified", that is, even the more positive ones hedged their ideas with reservations - worries and/or criticisms. Also, many of the views and opinions teachers had about computers in general were very charged, i.e. they were invested with strong emotional overtones to do with the impact and the use of computers, both good and bad, in society. For example, there were teachers who were concerned about the confidentiality of and access to personal data, and the possible abuse of power in this area of computer storage; while there were others who saw computers as powerful aids for the handicapped, for example.

In trying to discover the factors, or cluster of factors, that were important in determining the uptake of computers in a given department (research questions three and four), it was found that a supportive leadership style was seen to be a major determinant, but not always necessary, at the levels of both the department and school. It seemed that the majority of teachers initially needed strong guidance before they would venture into using computers in their teaching. A strong leadership style by the head of department which provided the necessary impetus for teachers to consider using computers, combined with appropriate leadership strategies for the

formulation of policies which provide resources, training and time, were important before any uptake of computers could occur.

The identification of organisational constraints (research question five) was more straightforward. Some of the specific organisational constraints perceived by teachers included that of insufficient time, lack of finance and resources, and the large number of pupils per class. Organisational constraints were seen by teachers as barriers which many of them felt could only be solved by members of staff who had the "power" to make decisions on such issues as the allocation of finance and resources, and the planning of the school timetable. Teachers also mentioned additional factors which were outside of the departments (research question six) which they perceived as important in determining the uptake of computers within the school. For example, they realised that the provision of adequate technical, financial and expertise backup had to be provided by their LEAs, and that careful thought and planning was needed if computers were to be effectively used across the curriculum.

Finally, in answer to research question seven, it could be seen that, in some cases, the uptake of computers in a school was determined by how one factor at one level would play against or convert another factor. So a fairly non-aggressive leadership style which gave constant informal support managed to permeate and change some of the prevalent negative attitudes of teachers to positive attitudes so that a slow uptake of computers occured. In another case, the perceived "self-images" of teachers were strong enough to cause an actual uptake of computers, in spite of organisational limitations. In other cases, the strong leadership style of a department head led to a number of changed attitudes which then led to a relatively large uptake of computers in the department. It was found that no one factor could be identified as the major determinant for the uptake of computers in schools. Instead, there were different combinations of factors interacting at the different levels of teacher, department and school which would lead to an uptake of computers. The strong views and opinions held by teachers - be it through personal anxiety over themselves or their teaching situation - interplaying with a supportive leadership style with clear strategies towards the introduction of computers, is one such combination which would positively lead to the uptake of computers.

CHAPTER 11 : CONCLUSION

11.0 INTRODUCTION

What are the factors that influence the implementation of microcomputers in a school ?

The research consisted of an in-depth study of the implementation of computers in a comprehensive school. The school had purchased seventeen microcomputers with funds obtained through a wide range of sources. Twelve of the microcomputers were for the school's newly formed Computer Studies Department, and the other five were for use within five major departments in the school where they were intended to be used specifically for Computer Assisted Learning (CAL) applications. The researcher, at that time, was working as a part-time teacher in the school and so was able to follow-up any queries or conversations, to obtain information on the teachers and departments, and generally to be there and observe how the school was run.

With limited resources and time, it was essential to confine the research study sample to only a few departments in the school. Since five major departments in the school had each decided to purchase a computer, it was felt that they would be the most appropriate choice for the sample. For each department, teachers were selected to encompass the policy-maker of the department (which was taken to be the Head of Department), an "experienced" teacher and a "non-experienced" teacher (an arbitrary decision based on the number of years of teaching experience). In the end, 15 teachers and heads of departments were chosen for the sample.

The research study was conducted in three major stages over a period of two years. The first stage was carried out between the months of June '82 and October '82 to observe the operation of the school. A short history of the arrival of computers into the school was also documented. The second stage (November '82 to April '83) tried to elicit, via semi-structured interviews, teachers' views and opinions about computers and their use in teaching. Prior to the interviews, two questionnaires were given out. The first asked for teachers' opinions on

methods of teaching and resources, and the second requested personal information about the teacher. Finally, the third stage of the research study (conducted in the summer of '84) consisted of another series of interviews aimed to record any changes of attitudes and to see the progress (or lack of progress) made by these teachers and heads of departments in their use of computers in the school. Lundgren's Frame Factor Theory, White and Lippitt's (1968) leadership categories, and Lewin's (1952) Force Field representations, provided frameworks to analyse and describe the computer innovation in the school.

It could be seen that the actual uptake of computers is very much dependent on the interplay of various factors at different levels. It became apparent that the views and opinions held by teachers about computers were not just black or white, but revealed an extremely broad spectrum of views, even within just five departments of a school. These views ranged from the very positive (the Favourable), to the positive with reservations (the Critical and the Worried), to the neutral range (the Indifferent and the Uninitiated), to the negative (the Unfavourable) and finally, to the very negative (the Antagonistic). Teachers perceived that the use of computers in teaching would result in changes in themselves as an authority (i.e. being competent), changes in themselves being in authority (i.e. being confident), and changes in their teaching situation (for example, class size). The use of computers was perceived by teachers to be a new and powerful technology that required specialist knowledge which could only be obtained through extensive learning and training. More worrying however, was that some of the teachers perceived that they themselves, by their very nature or abilities, would not be able to acquire this new expertise as they saw themselves as not "logical or mathematical" with some even seeing themselves as being too "old" or "set in their ways" for this new educational technology.

Organisational constraints were seen by teachers as barriers, which many of them felt could not be solved individually, but which needed cooperation from staff "above" them. Some of the main organisational constraints perceived by teachers included that of insufficient time, lack of finance and resources, and the limitation of having big class sizes. Time emerged to be a major organisational constraint with far reaching effects. Although time was initially seen as just providing the opportunity for training and using computers (including time for evaluating and

testing suitable software), what emerged from the research study was that providing sufficient time for teachers was crucial for them to feel and be competent and confident in using computers. The other major organisational constraint was a perceived lack of finance and resources to adequately sustain the computer implementation within the departments and school. This perceived lack of resources became more acute through the passage of time and as their awareness of the use of computers and the limitations of the computers that they had purchased grew.

When it came to actually using computers, the organisational leadership of the department heads seemed to play an important role. Favourable attitudes by heads of departments and appropriate leadership strategies that formulated policies which provided resources were essential before any take-up of computers could be achieved. It seemed that teachers initially needed strong guidance (even to the point of being shown exactly what to do) before they would venture to use computers in their teaching. This could be provided either voluntarily by the head of department (as was the case in the Geography department with a lassiez-faire leadership style) or with a little "forced" persuasion (as was the risk taken by the head of the History department with an autocratic leadership style). In a lassiez-faire environment, the responsibility for innovation (and for the associated learning and acquiring of skills) is left to individual teachers to take personal initiative. The Mathematics department however showed that the concern teachers had about how they felt they should be seen by society, seemed to be an overriding factor which led to a slight increase of computer usage. It could be hypothesised that the mathematics teachers became aware that they needed to be seen by society as being knowledgeable in the use of computers, i.e. they became concerned about their self-image. Thus, it seemed difficult to identify a particular factor that was determining the uptake of computers in a department of the school. Just as there were different departments, there were also different combinations of factors (of attitudes and leadership styles) under different situations that led to any real use of computers in the departments.

Finally, whether there would be a continual increase in the use of computers could also be seen as being dependent on local education and national policies. At the local education authority

level, this has to do with the provision of adequate technical and financial resources and the provision of expertise, among other things. At the national level, this has to do with a thorough rethinking of the curriculum, of how the use of computers could be integrated within various subjects. It involved the learning and use of different computer skills with an examination syllabus that reflected such priorities.

11.1 IMPLICATIONS OF THE RESEARCH STUDY

If the use of computers is to be successfully introduced into schools, then consideration should be made at the different levels of the teacher, the organisation of the department and school, and the influences outside school. Within each level, considerations of in-service training, support systems, management styles etc. could be examined.

11.1.1 At the Teacher Level

There are a range of possible approaches to cope with the variety of teacher attitudes about computers. It is important that the strategy and content of any in-service training (INSET) should consider the various attitudes that teachers have about computers (as provided by the categories in this study). It is recognised, however, that there is the problem of diagnosis, i.e. of being able to identify these different categories of teachers, and the problem of formulating specific in-service training courses that would be suitable for each category of teacher. There could be the possibility, for example, of considering the intake of INSET in terms of specifying experience, attitudes and level of computer knowledge. Although this would not get rid of all of the problems of inappropriate training, it might be a first step towards it.

INSET courses should be organised with a different emphasis for the various groups of teachers. Alternatively, if separate courses can not be organised for the different categories of teachers, then it might be beneficial to allocate a portion of the time of INSET for small group work where teachers could be divided according to these categories. Hence, for these different

categories of teachers with different attitudes, possible strategies of INSET courses (and hence content, approach taken and focus) that could be formulated would include :

1. For the Worried - The emphasis of the INSET courses for this category of teachers could be to build confidence in teachers by providing them with adequate training to acquire the skills for using computers effectively in the classroom. This is to enable teachers to perceive themselves as being competent and in control of the class situation. It might be worthwhile to stress the fact that computers provide a tool for teachers to enhance their teaching repertoire. Finally, different teachers with different self-concepts and from a wide range of subject backgrounds, could be encouraged to attend such courses, stressing the fact that it is not only for the scientifically, mathematically or logically orientated teachers.

2. For the Critical - INSET courses could be more open-ended for this group of teachers. The courses should be geared to handle the specific criticisms that teachers might have with regards to the use of computers. The different ways in which computers could be used in teaching could also be explored, with computers being used both with small and large groups as well as pupils from the two extreme ability ranges.

3. For the Favourable - INSET courses could be a time where teachers are able to share experiences of how they use computers in their teaching. The exchange of ideas and software (including training in the evaluation and testing of educational software) would be very beneficial to everyone at this stage. Some time could even be used to explore and develop new ideas and techniques in using computers in the classroom, and for those teachers who write their own personal software, hints and tips for doing so could be exchanged.

4. For the Uninitiated - The emphasis of the training could primarily be to promote a basic awareness and understanding of the use of computers in general, in teaching and in administration. The content of the course should therefore include demonstrations of the different ways of using computers and the impact and effect that computers would have personally, in society, and in their profession.

11.1.2 Department and School Management

11.1.2.1 Leadership Styles

Leadership styles of the heads of department and Headteacher played a very supportive role in the introduction of computers in schools. Thus, in the area of department and school management :

1. Very strong leadership, in terms of providing a clear, coherent and immediate computer policy for the department seemed to be critical at the early stages of an introduction. This strong lead is essential if teachers are to be encouraged to make the extra effort and time required in acquiring a new skill and expertise. In the long term, this leadership style could be a more democratic form of leadership so that any initial hostilities that might have arisen as a result of too strong a leadership role would give way to a greater sense of cooperation and work towards the common goal of using computers in the classroom.

2. Support from Headteachers is crucial. Teachers realised that any form of innovation was heavily dependent on the support and enthusiasm of their Headteacher. They felt that direction must be given by the Headteacher, but this direction must be backed up by adequate resources. They were however concerned that Headteachers should not just go ahead with introducing computers in schools as a "public-relations" exercise aimed to provide a better image for the school.

3. Overall school policy. In the long term, there could be an overall school policy with individual departments fitting into that plan. A definite and on-going policy by heads of department and Headteachers on the use of computers and the provision thereof, in terms of adequate department capitation, are essential to sustain a constant growth in the use of computers in the school.

11.1.2.2 In-Service Training (INSET) Programmes

Heads of departments and Headteachers play a crucial role in the nomination and selection of teachers to be trained in the use of computers. Most teachers do not have a direct say in this as the criteria for selection is normally left to the Headteacher and is chiefly limited by the amount of funds available for training, both in the school and in the local education authority. It might be advantageous in the long run for heads of departments and Headteachers to send teachers for INSET courses on the basis that :

1. They are those who would be given the responsibility to initiate some form of training for their colleagues, that is, to provide INSET within the department and school, and to implement the use of computers within the department and school.

2. They are those who would be given sufficient resources to provide help to their colleagues in using computers.

3. They represent a wide subject range of teachers, not just Mathematics or Science teachers.

11.1.2.3 Internal Support System

If schools regard it as important to be using computers, then it might be beneficial in the long term for teachers to perceive that their school is giving this priority in terms of finance, time and personnel resources being allocated. These can be shown in the following ways :

1. Providing Financial Support. Additional and sufficient resources could be provided by the heads of department and Headteachers, and could include not only the computers but the necessary peripherals, software and stationary that goes with using computers. It would be helpful if the departments' capitations could be budgeted so that all relevant purchases of hardware and software are taken into account. Preferably, finance to purchase full computer systems should be provided at the very onset so that teachers could immediately use the

computers in their teaching and not wait for other hardware or software to be purchased in the next financial year. Finance could also be provided for the provision of adequate facilities, for example, room(s) to safely house the computers, with suitable power supplies, or computer trolleys to transport the entire system which would include a large monitor, to different classrooms.

2. Providing People Support. Heads of departments and Headteachers could identify and appoint teachers who would be available and would be given the resources to help their colleagues in using computers in their teaching within the departments and school. It could also be advantageous in the long term if they could appoint teachers with the sole responsibility of encouraging the use of computers across the curriculum.

3. Providing Technical Support. Just as there is technical support provided for audio-visual equipment, there should also be technical help provided by the school for the use of computers. Technical expertise should be provided to handle minor repair work, fixing or making of new cable leads, monitors etc. These, teachers felt, should not be done by other teachers, but instead should be carried out by appropriately trained technicians.

4. Providing a Booking System. A booking system, similar to that of the audio-visual equipment, should be instigated whereby computer resources and facilities could be centralised (either within a department or within a school) and hence more efficiently shared by teachers.

11.1.2.4 School Timetabling

While having appropriate training courses and providing sufficient finance and resources go a long way in encouraging teachers to use computers, the continual demands on teachers' time imposed by the syllabus, school activities, etc. make it all the more essential that, if the use of computers is seen to be important, some form of priority be given to provide teachers with additional time for :

1. Personal Training. Teachers are under continual tensions and pressures to discharge their responsibilities as teachers. It could be helpful if teachers were provided with the time to know and acquire the skills necessary to use computers quite apart from the time needed to plan the lessons with the computers and pupils in mind. In addition, it could be profitable if extra time were provided for teachers to explore and experiment with the different uses of computers and to see whether any of the available software would be suitable for their teaching.

2. Department/School Training. It could be advantageous if training in the use of computers were conducted within the school and during the schools' allocated INSET programme. In Barnaby Comprehensive this included part of school hours when pupils would return home early for the day. This would enable teachers with other school responsibilities to attend these computer training sessions. It may be possible for more time to be given to the training of teachers in the latter part of the summer term, when most of the public examinations have been completed and when the teaching workload is comparatively less.

In addition, slots within the school's INSET programme could be earmarked for the training of different groups of teachers (according to the proposed categories of teachers as mentioned earlier), and not just according to department groupings in the use of computers in teaching. Preferably, according to teachers in Barnaby Comprehensive, these training sessions should be conducted by other colleagues in the school. This training could also include actual "hands-on" experience and demonstrations of the different ways of using computers, both in administration and across the curriculum.

3. Advice and help. Time could be given, and preferably timetabled, for those teachers who would be helping and advising their colleagues in using computers. These teachers should not be expected to put in too much of their own personal time, especially when it is the entire school that will benefit from their endeavours.

In addition, the school timetable could provide opportunities for :

4. Involvement from a wider pupil range. Opportunities could be provided for all pupils to be able to use the computers, and not just the pupils in the extreme ability ranges. Specific time could be allocated to allow different groups of pupils to use the computers in the school.

11.1.3 At the Education System Level

Although the research study did not look specifically at the education system level, teachers mentioned factors that influenced their opinions about and actual use of computers. What is provided here are suggestions of research implications as a result of some comments made by teachers. It is realised, however, that the British educational system is already under financial strain, and any financial, technical or training support given to encourage the use of computers in schools would mean a reduction in support for other curriculum areas.

11.1.3.1 County (LEA) Support

As was the case with support from heads of departments and headteacher, teachers also felt that efficient and immediate County or Local Education Authority support is crucial for the school that attempts to introduce the use of computers.The is especially in terms of :

1. Financial Support. There was a lack of understanding among teachers as to whose responsibility it was to provide adequate finance for introducing computers into schools. According to some of the teachers, adequate finances and back-up could be provided by the County (and not by Parents Associations) before the County encourages schools to embark on such an implementation. Finance could be provided not only for the computers systems and related hardware and software configurations, but also for the training of teachers and for providing relevant expertise to schools.

2. Technical Support. The quick and efficient technical support by County (for example, in the memory upgrading of computers) would be vital to sustain the growth and use of computers in schools. It would be beneficial if County could coordinate with the national authorities

(especially the DES and the DTI) to quickly decide on the computer hardware that it will support in schools.

3. Dissemination of software and software information. LEAs could link in with central software organisations so that constant and up-to-date information could be made available to schools. This is especially important in the area of software and hardware reviews, and in the exchange of ideas and feedback between teachers and software houses.

4. Training for decision-makers. It could be advantageous for LEAs to provide a separate training programme for heads of departments and Headteachers. The content of such training could include aspects that have been discussed above, but the point being made is that it is vital that the managers in schools should be trained to be more aware of the dynamics involved in the introduction of computers within their departments and schools, that is, the social relationships, organisational and managerial considerations involved in any implementation.

5. Length of INSET courses. Teachers felt that any INSET programmes should be more than just a few hours of a day stretching perhaps, to at least three full days, so that adequate ground could be covered.

11.1.3.2 Curriculum Planning

1. Planning across the Curriculum. There seemed to be a need to coordinate the use of computers in the various subjects. This is to ensure that different types of CAL are being employed by teachers and that different skills are being acquired by both teachers and pupils across the curriculum as a result of using computers. The problem would be to ensure that the same computer skills being taught in different subjects would not be excessively duplicated at the expense of other computer skills being neglected. For example, the use of databases by both the History and Geography departments and wordproccessing by the English and Business Studies departments should not be covered at the expense of forsaking the use of

simulations or modelling in other subjects. In addition, pupils should be safeguarded so that they would not have an unnecessarily excessive exposure to computers.

2. Examination syllabus. Teachers are concerned that the present examination syllabus did not positively encourage them to use computers in their teaching. If the use of computers is important for both teachers and pupils, then teachers feel strongly that this could be reflected in an appropriate way in the syllabus.

11.1.3.3 Software Development

1. Any software which is being developed and written, could be such that :

a. It would provide immediate personal benefit. This is especially so for software used for administration. Any software written that would save time for teachers in school administration and not involve too much learning on the part of the teachers, could be immediately popular.

b. It is very "user-friendly" and robust. It is important for teachers to be able to use software quickly and easily, and to use software which allows them to make mistakes without the program "crashing". This is especially crucial as teachers would not use any software which could make them appear incompetent in front of their pupils.

2. Writing and vetting educational software. Teachers were aware that it was inadvisable for them to be writing software. They felt, however, that software development teams which included teachers, computer specialists, representatives from examination boards, universities and colleges were important. They also felt that these groups could provide the necessary guid elines and evaluation reports of vetted software (similar to examination syllabus) which could be easily referred to by teachers when considering the purchase of specific types of software.

3. Software information networks. Teachers realised that the communication and information systems whereby they could be informed of the latest software and how best it could be used in the different teaching situations, needed to be examined. Teachers suggested that schools could be electronically linked with national networks (like Micronet) where such information could be easily accessible to any teacher as opposed to the department heads receiving catalogues from publishers via the traditional channels. In addition, software could be provided in Teacher Centres, where teachers could preview and evaluate software, and software information could be provided in subject-related periodicals or teacher magazines, and not just computer magazines.

11.1.3.4 National Programmes

It is worth noting that no mention was made by teachers (with the exception of one) of the government's national efforts to encourage the use of computers in schools. The exception was by a head of department who only referred to the Department of Trade and Industry's (DTI's) subsidy scheme of providing 50% discount to a school purchasing a computer (one per school). He saw this scheme as a "whitewash" idea which would be unfair to larger schools. Two other teachers mentioned that they had attended an INSET course, but did not associate it with the fact that they were required to attend as a result of the school purchasing a BBC computer under the DTI scheme.

There appears to be a need for more effective communication between national initiators of computer innovation and "grassroot" users. Teachers in Barnaby Comprehensive were unaware of any of the training courses that were being organised (for example, courses organised under the auspices of the Microelectronics Development Programme) or the teacher-groups that were set up to develop new and appropriate educational software. More rigorous publicity and information channels could be set up to filter any information at the national level to the individual teachers in schools. The assumption that information sent to a school via the Headteacher or even the heads of department will reach the individual teacher, should not be made.

11.2 RESEARCH LIMITATIONS AND FURTHER RESEARCH

One of the main limitations of this research study, as a result of finite time and energies, is that the investigation carried out in the school was restricted to only a small sample of teachers and heads of department in a school. No observations were carried out in the classrooms or with pupils, and other teachers and departments were excluded from the research study. Thus, an immediate area of further research would be to increase the breadth, depth and time of this research study. This could be done by separate research studies looking at each aspect in turn, or by a major study. For example, it would be useful to look at the rest of the teachers within the five departments and to look at the other teachers in the other departments who have started using computers in the school. This would be important to clarify the findings already highlighted in the present research or even to "throw-up" further combinations of factors that would influence the uptake of computers in the school. Another immediate area for further research work would be to analyse the views and opinions of pupils towards computers and the use of computers in their lessons. In addition, it would be important to examine the processes of learning and interaction that pupils have between their peers, with their teachers, and with the computers as a result of the use of computers in the classroom. This is a work started by the ITMA Collaboration. It would also be crucial to pursue the research to the point where computers are used in various sorts of ways, in different classrooms, and with pupils of different abilities and backgrounds. This research could also be conducted for a longer period of time (i.e. a longitudinal study) as any real uptake of computers would require a much longer timescale. Attitudes, leadership styles and strategies might change through the passage of time, which would lead to a different picture of computer innovation in Barnaby Comprehensive.

In addition, other similar case-studies could be conducted in other schools, so as to provide different approaches to our understanding of the implementation of computers in schools. It would be interesting to find out whether the different categories of teachers and leadership styles of heads of departments are also prevalent in other schools, and if so, what sort of

schools. Are the interplay of factors at the different levels similar to that of Barnaby Comprehensive, or would there be other combinations of factors interacting ?

Just as departments are socially organised within a school, so too are schools organised within the social structure of Local Education Authorities (LEAs), and these in-turn are organised within the educational systems and political structure of a country. Schools are affected by external influences which would encourage or hinder the use of computers in schools. It is thus vital to look at these other levels of an innovation. For example, it would be important to understand the roles that LEA advisors might have in the introduction of computers into a school, or to understand the extent that financial policies of LEAs would determine the uptake of computers in schools. This analysis could then be extended to the national level to look at, for example, the roles of HMIs or the effects that national policies have on schools. Lundgren's Frame Factor Theory, White and Lippitt's categories of leadership styles, and Lewin's force-field representations, for example, provide suitable models and tools to examine such innovations at these various levels, with a visual and dynamic display of the forces at work.

However, even with this single research study which was based on fifteen teachers within five departments in a school, there can be further areas of research work to be done as a natural follow-up. This could be in the following areas :

1. Teachers seemed to be more concerned about the damage that would be done to computers by pupils, than the damage that computers might cause to pupils either physically or educationally. Do teachers see "class control" with respect to the use of computers, as a reflection of their competence as professional teachers ? For example, if computers were damaged by pupils during a lesson, would teachers perceive that this would be a poor reflection on their reputation as a "good" teacher ? This research seemed to indicate that teachers were concerned about how they were seen to be in control of the situation. More work needs to be done to identify the elements of a class environment that lead to such perceptions by teachers, or to check whether these perceptions, for example, are an indication of deeper worries or tensions which are related to how they perceive themselves and their teaching profession.

2. Teachers seemed to have the impression that the use of computers was only for the brightest pupils or for the low-ability pupils. What are the dangers of computers becoming either an elitist toy (for the brightest pupils) or a compensatory aid (for the low-ability pupils), such that the pupils who are in-between the ability range are left out ? Can there be different but appropriate ways of using computers for each of these groups of pupils ?

Another related problem seems to be that if pupils from the two extreme ability ranges were to use computers, would pupils themselves label each other as "dull" or "bright" if they were requested by their teachers to use the computer ? On the other hand, there seemed to be the idea that teachers think that using computers gives the impression that they are "progressive" and professional ? If this is true, there is thus the problem that if a teacher uses computers, he/she is considered "progressive", while his/her students is labelled as "dull" or "bright". Research needs to be done to find out whether this is a prevalent feeling amongst pupils and teachers, and if this is so, can different approaches be used in teaching with computers so that this problem is avoided ? How does one get away from labelling either pupils or teachers when using computers ?

3. The use of computers can be seen to involve new and different ways of teaching, with a corresponding change of roles (an area that was also initially explored by the ITMA Collaboration). Further research needs to be done to investigate, for example, these new forms of teaching and its effects on class discipline or the organisation of the class. Would there be extra tensions, as well as new areas of challenge, developing as a result of this new and powerful educational technology ?

Related to this is the question of whether Computer Studies as a separate subject should be disbanded, and replaced with an emphasis of using computers across the curriculum. If so, how can computers be effectively used across the curriculum ?

4. Finally, this research had shown that leadership styles within departments play a role in the uptake of computers by teachers. It would be helpful to explore, in greater detail, the sorts of management styles that are prevalent within departments in other schools, and to see how these styles actively encourage or discourage the use of computers. This would provide further and essential input to any INSET courses organised for the local management in schools.

There is a need for further research to investigate the necessary ingredients for an effective in-service training programme that could be conducted within the school itself. As this research study has shown, one of the key ways of promoting a real uptake of computers in the school would be to conduct regular in-service training programmes not only for individual teachers but also for heads of departments and headteachers. Research needs to be done to find out what should be included in INSET courses for teachers, and separately for policy or decision-makers in the school. Furthermore, would teachers from schools be the best people to conduct these courses or would "professional" or even commercial agencies be the best people to be contracted to conduct such courses ? Would INSET courses be most effectively conducted in schools or should it be conducted in Teacher Centres or even Universities and Polytechnics ? Although this research has suggested that INSET courses within the school itself is essential, more work needs to be done to discover how this can be effectively and efficiently carried out.

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APPENDIX A : Interview Checklist For Heads of Departments, Heads of Houses, and Headteacher on the running of Barnaby Comprehensive.

Heads of Departments

1. What do you see as your role as Head of Department ?

2. In what way does the department help a teacher in his or her teaching ? What is the turnover like for teachers in your department ? Does this affect the department greatly ?

3. What would be the department's criteria of assessment in allowing a new teaching method, aid or equipment to be introduced ? How will the department's policies be discussed, made and carried out ?

Heads of Houses

1. What do you see as the role/roles of the Head of House ? How do you see your role as Head of House ? Are they different ?

2. What does a "typical" week's work entail ?

3. Are you involved in any curriculum development or teacher training as Head of House ? Say if you recognise a need across the board of pupils, for example, among gifted or remedial children, can you do anything about it as Head of House ?

4. Were you involved in any way, as Head of House, with the introduction of computers into the school ? Were any other Head of House involved ?

Headteacher

1. What do you see as your role as Headteacher ?

2. How does the school help a teacher in his/her teaching ?

3. What would be the school's criteria of assessment in allowing a new teaching method, aid or equipment to be introduced ? How will the school's policies be discussed, made and carried out ?

4. Is there a formal/informal network of communication ?

APPENDIX B : Interview Checklist for Headteacher and Head of Physics about the arrival of computers in Barnaby Comprehensive.

Headteacher

"What I would like to do is to specifically look at the arrival of computers into the school (from the very first PET computers); and especially to trace the influences (both internal and external) that contributed or hindered its introduction."

1. How did the school obtain its first PET computers ? What was the initial aim of obtaining it in the first place ? Who was involved in it ? Was there any critism/scepticism in obtaining it ? Was any parents/pupils involved in it ?

2. What contribution or discouragement (no matter how small), did the following make to the introduction of computers in the school ? In what way ? Could we look at it one by one ?

a. Parents Association.
b. Individual Parents.
c. Board of Governors.
d. Senior teachers.
e. Keen teachers.
f. Pupils.
g. Any others ?

Head of Physics

1. History of the use of computers in the school :

a. When did computers first appear ? How did you obtain it ?
b. What were they used for ? Who used them ?
c. Was there great interest shown in the computers ? Why ? What are the teachers'/heads of departments' attitudes to them ?

2. What is the present use of computers ? Do they use them for instruction? Are there any formal or informal training in the school/out of the school for them ? Are they allowed to bring a computer home ?

3. What are the future plans ? How do you hope to get other teachers interested in it ? In what way ?

4. With respect to finance, can the school or department afford CAL packages ? Do you hope to produce your own ?

APPENDIX C : Questionnaire on Teaching Methods and Resources.

Name: _____

I. Let us first concentrate on the area of the way we teach - the different approaches of presenting information to pupils.

1. In a situation in which there are no constraints (eg. economic, social, personal), where you have full control of all conditions, what sort of teaching methods or approaches will you prefer to use in your teaching ?

2. Why will you prefer to use these approaches rather than others ?

Realistically however, we may find ourselves using other methods and approaches due to various reasons.

3. In practice, what methods of teaching do you use ?

4. What are your reasons for using these teaching methods ?

II. Now let us examine the resources(*) available for our teaching.

5. If you could use whatever resources you wanted, which would you most like to use ?

6. In reality, what resources do you use ?

7. Why do you use these resources ? What in general are the reasons (personal, dept. or school) for your using these resources ?

(*) Materials, aids, tools or whatever helps you in your teaching.

PLEASE ADD PAGES IF YOU HAVE MORE COMMENTS TO MAKE.

APPENDIX D : Biographic Data Questionnaire

1. Name: _____ Dept.: _____ Post: _____

2. Date of Interview: _____

3. Age: _____ Sex: _____

4. Academic Qualifications: _____

   Main Subjects Taken: _____

   _____

5. Teacher Training: YES / NO Qualifications: _____

   Main Subjects Taken: _____

   Subsidiary Subjects Taken: _____

   Level: _____

6. Number of Years Teaching: Overall - ____ yrs.; - _____ yrs.

   Main Subjects Taught: _____

   Others: _____

   Level: _____

7. Any form of training courses being taken at present ? YES / NO

   If YES, what are they ? _____

   _____

8. Other Involvements (that is related to teaching) ?

   _____

   _____

   _____

9. Any other details you would like to add ?

   _____

   _____

   _____

   _____

CONFIDENTIAL

APPENDIX E : Interview Checklist for Teachers of their views and opinions about computers.

Teachers

INTRO: "What I would like us to talk about is your personal views about computers in general; and how you see them being used in teaching. What do you think are their uses ? Are there any good or bad memories that you have about computers ? Why do think that this is so ? Has it changed since ? Let's start with the first question."

1. When was the first time you became aware of computers ? Was it through other people using it or seeing it being used somewhere, or was it on a course you attended; or you just read about it in the newspaper or a book?

   What sort of computer was it (micros or mainframes/terminals) ?

   What were your first impressions of computers ? What sort of impact did it make on you ?

   Have you had any more contact with computers since then ? What were they ? Have your impressions and feelings about it changed as a result of it ? Why have they changed / have not changed ?

2. How does any of this (or anything else) affect your views about using a computer in your teaching ? Have you, for example any feelings about whether it would contribute positively or negatively to your teaching ? Do you think that using a computer will help you in your teaching or that it will be a hindrance ?

   In what way does it help you or hinder you ? How do you personally feel ?

   If -ve attitude: Could you imagine in any circumstances that the computer could contribute positively ?
   If +ve attitude: Could you imagine in any circumstances the computer being a "bad thing", a hindrance to your teaching ?

3. What sorts of ways can you see yourself using the computer and how are they different ? Do you think that there are various ways that you can use it for your teaching ?

   What are the sorts of snags for you, that you presently see in using the computer ? Do you forsee that you will come up with certain difficulties? What are they ?

   How would one go about solving or finding a solution to these snags ? Who, do you think, should or could go about finding out some solutions to these difficulties ?
   (Go through snags one by one).

   Where, do you think, there might be further snags and difficulties. Let's look at it at different levels ? Say for example, within the department level. What sorts of snags will you encounter at this level ?
   How about the school level ? And finally, how about your own personal level ?

   What is it that you will like to know about computers before using them ? Do you think you need to have a certain amount of information or training before using the computer ?

4. I am sure you are aware that your dept. has bought a computer. Do you know what type it is ?
   Do you forsee yourself using the computer in any way then ? Have you got any actual plans of using it at the present or near future ? Are you thinking specifically of a certain form or ability ? Why is this ?

5. Could you summarize, in a few words, what your view and opinion to the use of computers in your teaching is ?

APPENDIX F : Interview Checklist for heads of departments and Headteacher about their strategy on the implementation of computers.

Heads of Departments

"I have noticed that your department has decided to purchase a BBC computer ".

1. How do you intend to introduce it and encourage your staff to use it ?
2. Can I monitor the progress (for a period of one to one and a half years) ?

Headteacher

1. What was your criteria for introducing such an innovation in the school ? What were your reasons for going ahead to purchase such a large number of computers ? Do you think it was a bit of PR work ?
2. Where do you see the introduction of computers in the school heading ? What are your steps or strategies that you have in mind or are already embarking on to make this introduction effective ? Is it across the board?

APPENDIX G : Interview Checklist for teachers on the "state-of-play" of computers one and a half years later.

Teachers

"What I would like to find out in this interview is the progress that you have made in the use of the computer in your department".

1. Have you used the computer since I interviewed you the last time ?

   If yes, why ?
   in what way ? How often ? For how long ?
   for who ?
(Did you use the computer in the department or in the computer room ?)

   If no, why not ? What were the problems that you've found ? Were they personal factors or had it to do with the department, the school or other teachers ?

2. Any future plans ?

3. As a summary, could you say in a few words what was the most important success that you made in using the computer
   and
   what was the most important obstacle or problem that you encountered in using the computer into your teaching ?

Appendix H : Checklist for the Final Interviews with Heads of Departments and Headteacher about their strategies, one and a half years later.

Heads of Departments

"What I would like to find out in this interview is the progress or the lack of progress that you and your department has made in the introduction of the use of the computer in your department".

1. How do you think your initial plans of introducing the computer into the department have been ?

   Has any progress been made ?

2. Do you find that your members of staff have been using it ?

   Who ?
   How often ?
   In what way ?

Have you yourself been using the computer ? In what way ? How often ?

3. What do you think are the problems you have encountered in introducing it into the department ?

   * In the use of the computer ?
   * Software
   * Hardware
   * How has the staff reacted to it ?
   The difficulties that they have found ?

   * Has it had any impact on their teaching ?
   - Class management ? Teaching Style ?

   Has it had any impact on the curriculum ? In the school as a whole ?

   * Were there any unusual or unexpected problems that cropped up ?

4. What are your future plans ? Do you see any radical changes in your initial plans or do you think you will carry it on in the same way ?

   How do you now see the computer fitting or not fitting into the department in terms of

   * the teachers ?
   * the programs used (software) ?
   * the classroom ?

5. As a summary, could you say in a few words what was the most important success that you made in introducing the computer
   and
   what was the most important obstacle or problem that you encountered in introducing the computer into your department ?

Appendix H (contd) :

Headteacher

"What I would like to find out in this interview is the progress the school has made in the introduction of the use of the computers in the school".

1. How do you think your initial plans of introducing computers into the school have been ?

   Has any progress been made ?

2. Do you find that your members of staff have been using it ?

   Who ?
   How often ?
   I n what way ?

   Have you yourself been using the computer ? In what way ? How often ?

3. What do you think are the problems you have encountered in introducing it into the school ?

   * How has the staff reacted to it ?
     The difficulties that they have found ?
   * Has it had any impact on their teaching ?
     - Class management ? Teaching Style ?
   * Has it had any impact on the curriculum ?
   * Were there any unusual or unexpected problems that cropped up ?

4. What do you now see as being the most critical factor in introducing the use of computers into the school ? What is the critical factor that would

   * encourage the use of computers in the school ?
   * discourage or inhibit the use of computers in the school ?

5. What are your future plans ? Do you see any radical changes in your initial plans or do you think you will carry it on in the same way ?

6. As a summary, could you say in a few words what do you think is the role of computers in the school ? When the "halo" or novelty effect has worn off, where do you think it will end up as - as just another teaching aid, or something else ?

APPENDIX I : Sample of 2 interview transcripts of teachers' views and opinions about computers.

1. Mr. Joule (Mathematics)

Interviewer (I) : When was the first time that you sort of, became aware about computers? It's not necessary within the school, it could be out of school. It could be through newspapers, books... you know, the first time you became aware of them. What sort of impressions did you have about computers ?

Mr. Joule (JOU) : The first time I came to be aware would be about 18 months ago. Something like that. Mainly because Mr. Bohr had them in school and I knew him reasonably well and he offered to lend me one, one week. And that was my first personal contact with them apart from seeing them on tele, you know. That was it and I borrowed a PET. Actually it was over half-term, and just started to play with it, discover what it did; and that was really when I started, or my first contact with computers. And that's really what I've done since. I've never used it in my teaching. When we got the BBCs in I borrowed those a couple of times. But I'm still not that "genned-up" on them.

I: I mean, just really what I'ld like to know and understand, I mean, I should have mentioned it before but whatever we say will be confidential. I'll be having to write reports but when I do that, I would generalize. Be rest assured that no one hears the tape apart from me.
When you first brought the PET home, what was your impressions about the computer ?

JOU: Well I was quite impressed, I suppose. I mean obviously, he had given me a couple of tapes and he had given me a set of notes on very simple BASIC so that I could try and follow it through, which is what I did. I followed a course that he had from some other University somewhere that somebody prepared, and that really gave me a basic idea of the language on PET. My imagination is not that good. I'm not very creative so I don't really, and never have really seen the potential, myself, of what I could do with it. I appreciate it when other people show me what they can do. But I don't think I'm creative enough to be able to use one... really with my own ideas. Not at the moment anyway.

I: And you've said since then that you've borrowed the BBC.

JOU: I use the BBC now.

I: How often did you borrow it, and has your impressions changed as a result of borrowing the BBC ?

JOU: Well with anything I'm even more impressed with what you can get inside a little box, you know. Seeing what it can do. I went on a course for two days with Mr. Mikado last term. There was a chap there who obviously knew a lot more about it then anybody that I've met before and was able to demonstrate its potential and you know, it really is very impressive in what it can do. I find it a bit frightening in a way but in lots of other ways, of course, it's going to make life for lots of people much simpler. So you know, I suppose, there are good sides and bad sides to it.

I: By going to the course and bringing the BBC home and looking at the PET, has that affected your views about using it in your teaching. I mean, you mentioned the word "genned-up". What do you mean by that ?

JOU: I still don't feel that competent. That's really what I mean. I don't feel that competent on the machine. I haven't been able to put the time in that I would like to become really familiar with it. There's so many other pressures. When I tend to take one or when I tend to use one, I don't get an aweful lot of time in which to really explore its true potential, I don't think. I'm still really very much a novice, and until, I suppose, I can find time to become more familiar with it I probably won't use one. I find the pressure of teaching to the exams that we have at the moment, is not flexible enough to introduce a bit of computing just for the fun of it. And as it's not an integral part of our Maths course at the moment, it may be in the future but at the moment it's not, then I have other things that must come first. You know, my responsibilities are to make sure that the pupils cover what they are suppose to cover for the particular exams that they are doing. Computing as an entity....

I: I'm very interested in this really because that's why I'm doing my research... to find out, you know, the problems and the issues (not so much the problems because it may not be problems) but the issues that teachers' face and consider whether they want to use a computer or not want to use a computer. So is it possible for me just to go in a little bit more depth about some of the things that you've mentioned ?

JOU: Yes, you can try.

I: You mentioned about "being frightened". What do you mean by that ?

JOU: Well I find that the implications are frightening when you see some of the potential uses for them in terms of... you know, in a national sort of level, of storing information, access to information, confidential... personal details. This sort of thing I find frightening. Whereas uses of... well not necessarily computers, sort of, microprocessors of various types to aid the handicapped to cart around, mobile... to use this sort of systems. That sort of things are tremendous, fantastic. So, you know, it's got a good side as well as a bad side. I'm frightened by the power that it can give to individuals or groups of individuals if it is used in that way but impressed by the power that it can give to people who perhaps need help. So, you know, you've got the dilemma. You've got to have the controls as well which of course Government tends to work on anyone. Hopefully they will to make sure that there are measures to make sure. You don't have a sort of centralised computer run police state, you know, which is the ultimate. It's most unlikely to happen but could, you know, in an extreme. You know, that's what I find frightening.

I: It's interesting to hear as well how you feel that could be controlled, overcomed. I mean in the same way in terms of, you mentioned, of "being competent" in it. What do you mean by that ? How can you, sort of overcome it ?

JOU: In terms of design rather than material, I think. I'm not, I don't understand the machine well enough to be able to produce sophisticated material that will be needed for the level of work that I do in my classroom. You know, if I wanted to use them, I would probably want to use the graphics quite a lot with the Maths especially when you are doing, sort of, graphs in inverted commas... that sort of things. I mean, you can show how things go. You can use colours and so on. But I haven't got the skills at the moment to be able to prepare programs like that, of the type that I might like to use. They are starting to come onto the market but they are expensive. And even if they were available, readily available, we don't have the facilities to use them anyway. We've got one machine in the Maths department. You would really want a batch of them available. If they are going to be of any use, they almost got to be as available as a pocket calculator, so that any child can turn to it and not have just one there in the corner. Then, of course, you've got financial restrictions on that.

I: Do you see how these things can be overcomed or is there someone who should look into it or could look into it ?

JOU: Well, the biggest problem is going to be money. I mean we've got a computer's... a computing department here, in a small way. But to get access to it from a class point of view from teaching my subject would be very difficult, cause I would want to be in the Maths area. I don't really want to have to move around in the school everytime I choose to use one. And a lot of the time, it could be quite impromptu, you know. You might suddenly decide "Ah yes. At this point it would be a good idea if I did such and such a thing on the computer". So therefore they must be available all the time. You must be sure that they are available. I think the whole... the syllabus is going to change as well in order to incorporate it.

At the moment there is no need for computers - quite adequately teach anything we need to teach, without it. In the "A" level work, I suppose, which I am involved with a little bit of Statistics, it would be nice to have one or two of the more sophisticated operations on the tape, already programmed, which you can get. I've seen and used one or two, which really is just using the computer as a glorified calculating machine. That's all you are doing. Apart from that, I don't honestly see it being used in our department for quite a while. There are too many things. You've just got to get on with everyday work.

I: I mean, you are talking about priorities. So what do you see at present, is the priority ? How does that affected the way....

JOU: The priority in our department I would think is to improve what we do with very limited resources cause money is short. I don't think we do enough in this school or probably in most

other schools, for the lower ability children. I still don't think we've got a scheme which is suitable to them. Not possibly this is a computing... or using a computer rather, as an aid, is an area we could look at. But as an aid and not so that they would study... follow a course in computer studies. They would simply use the machine with material that was already available.

I: Well that's really, I mean, the whole interest of mine is to see it as an aid and not so much into computer studies. So in terms of priorities, you see it as improving what you are doing. You see it for the lower ability group.

JOU: Yes, I can certainly see it coming in with lower ability groups more, in some ways, than the higher ability groups, because they are usually quick enough to be able to get on, and they are sufficiently interested and motivated anyway; and they can see the purpose behind what you are doing. Whereas the lower ability children, they struggle, they get fed-up, they need something that brightens up their day, and something different. And so they could well be useful, you know, in that area of school, I think, if suitable programs are available for it.

I: I'm trying to get, you know, more and more behind how you really feel. You talked about priorities and you talked about suitable materials. What do you see... you must be convinced about before you say you would like to use the computer ? Or are there real problems and other considerations that I haven't understood yet ?

JOU: To be honest, I am fairly indifferent to the computer as a teaching aid at the moment. I don't doubt that it would become more important in the future but for me at the moment, I think it still tended to be regarded possibly as a bit of a toy. You know, it's fine, it's fun but I don't regard it as being, in terms of my work at the moment, you know, any... that important really. I can't really explain it in any other way. I just... I don't suddenly want to jump up and down and think "Great, this is it, you know, I must have one." I don't feel like that at all. I could quite happily live without one, without it bothering me in the slightest. So, you know, that really are my feelings about it. They don't... although I am impressed with them, you know, personally. From my job point of view, okay, nice if you've got them but I could quite happily do without one. Those are really my feelings on it, I suppose.

I: Is it affected by your work in the department or is it your own views ?

JOU: No, it's just me, just me. I mean, I've seen a lot of computer work because I had done a couple of Open University courses and they use computer animation a lot. They use computers to illustrate a wide variety of things and I found it extremely helpful. But often at the level we're dealing with in a school you can just as easily do it with a piece of chalk or an overhead projector, and a lot quicker, you know, on a big screen. So I think perhaps the material that we are dealing with are a lot of the time, I perhaps feel, unless somebody is welcomed to convince me otherwise, that at the moment I can cope quite adequately with talk, chalk and overhead projector.

I: I think it's a fair statement. Would it then be right for me to say that if you find suitable material, I mean, what are your conditions for suitable material ? Would you then consider using it ? Or are there other factors ?

JOU: The only way I could judge suitable was by watching it and then saying well what impressions it had on me. I don't think I've got a list of criteria which says it must fit these. It's like using television programs. You know, I would want to watch it and then judge on... I suppose you've got to say "Well does it cover the topics that I want it to cover ? Does it do it in the way which is readily understandable by the age group that it is aimed at ?" I suppose these sort of things are at the back of your mind but I don't think I make a list of them consciously. I look at it and I just say "No that's not suitable or yes, that is suitable." But I suppose, mentally I'm running through a little checklist but I've never really though about it too deeply. I look at the stuff and say "No, that's no good for the groups that I teach, or yes it is, that's okay". So I would want to see any material... have a good look at it before I decide whether it's suitable or not.

I: I'm aware that your department has got some SHARP computers.

JOU: Yes, we've got little ones.

I: Do you use them or...

JOU: We haven't as yet. We were going to introduce a mini-course for some of the children but it hasn't come about yet. Mainly because of pressure getting through the work anyway. It's difficult

to fit these things in. I've got one which I use personally sometimes just for, you know, little things; and I've tried to familiarise myself with it so that if we ever decide to do something with the computer course then I know how the thing works. But apart from that, we haven't really push that very much at the moment.

I: I mean, would you use it or you will only use it because the dept has decided to use it ?

JOU: I only use it... I mean, I've got it at home at the moment. I very rarely get it out to do anything with it. I've no personal use for it at all. You know, if I want to do my accounts, it's just as quickly to get a piece of paper.

I: So you see it in terms of the dept. buying the computers or the SHARP computers. If there is no sort of dept. policy of using it, would you want to...

JOU: No. We've talked about it a couple of times. We've talked about it, doing it with the 3rd years say at the end of the summer term when the pressure is off and some of the 5th years have left and there is a fairly sort of holiday sort of atmosphere, you know, we're unwinding towards the end of term. We've talked about doing 2 or 3 weeks then. Whether we will or not, I don't know. But it would need somebody to prepare the material which probably would have to be me. And so whether we do go ahead or not, I don't know. I can't really say. I think it is unlikely this year actually. We would have to wait and see, I don't know.

I: You've mentioned the word about it's not "flexible". What do you mean by that ? You mean the syllabus, full stop ? You think it was not flexible ?

JOU: Oh yes. Well, we are bound by what we would have to cover in a given year, and especially in the senior school when you are looking at the examination syllabus. There's no flexibility in that. You have to cover it. So I think that really was what I was talking about there. You know, there is no flexibility on the system, in what we have to teach. And usually, covering what we have to teach takes most of my time if you are to do it properly. And there is very little time to diverge. You have to, you know, really stick to what you've got to cover for the children's sake really. You owe it to them to make sure that you do.

I: So you see using a computer as diverging ?

JOU: Yes, diverging from the present situation, yes. As things stand at the moment, we don't need one. You know, we could... as I said earlier, we could operate quite happily without one, you know. Ultimately I think it would be part of our role and I think it would be included in the course to make them aware of its potential for doing some of the work which we are currently doing. But that would probably not happen for 2 or 3 years.

I: Why do you see using the computer as diverging if say you use the computer to teach a part of the syllabus ?

JOU: I wouldn't use it to teach. I would use it to, just as a... like showing a film or watching a TV program. Just a supplementary to whatever I was doing. Just as an aid like using the overhead projector. I would still see the teacher as the central figure in any communication that was going on.

I: Oh yes.

JOU: I think, you know, at the end of the day, they are nice machines but at the moment I'm quite happy just to be a classroom teacher and leave it at that. Perhaps I'm a bit old fashion.

I: No. That's what I said, I'm very interested to just find out your reasons because these are....

JOU: The trouble is, you see... I mean, my only contact with them is the contact that I've made the effort to obtain. I've never had the luxury of being at a college or a university where we've had hours and weeks spent on them to really find out what it is all about. They are still very new to me. So, I can't really see how I can use it in my work because I don't know enough about them myself; and until such time as I do, I'm not prepared to use them.

I: Would you want then to find out more ?

JOU: When time permits but it doesn't at the moment - got more than enough to do. You really need more than the 2 day, 3 day course; which all that really did was familiarise us with the keys which I already knew anyway.

I: How did you find that course ?

JOU: Oh it was alright.

I: It was run by ?

JOU: It was ran by the County but it was really meant for people who had never touched one before. So the first day and a half was, as far as I was concerned, was really a waste of time. Very good for some people who had never seen or touched one before. They enjoyed it. I just found it a little bit boring. Some of the stuff was very good. You know, it's going to be a while I think, before it really comes into my teaching and probably only teaching in our dept.

I: So you've got no specific plans or have you got any plans to use the computers ?

JOU: None at the moment.

I: Finally, could you sort of summarise in a few words what your views and opinion of computers in your teaching are.

JOU: At the moment, they are a long way down the list of aids, and I think that they will probably remain that way for some time. Mainly because I suppose, that... it's cost that's one restriction. Until they are readily available for everybody to, sort of, get a hold of one and have lots around and accessible for the children, then I don't really see much point. I'd rather use, as I said, the overhead and films or TV programmes when necessary, although we don't tend to use TV programmes that much. So, at the moment, I'm just in limbo. I just... I don't feel either way. I'm not going to rush round saying "No, I'm not having them", at the same time I'm not jumping up and down saying I want one. I feel indifferent, I suppose, really. This sort of sums it up at the moment.

I: And you think that will change ?

JOU: Well, difficult to know. I suppose, as time goes on it will have to change anyway because they will become, I don't doubt, increasingly more important. And as they do so then we will have to change in the school anyway. The demands from society will make us change.

I: And are you looking forward to that ?

JOU: Well yes, I don't mind change but, you know, when you do something it's got to be done properly and not "hotch-potch". So one machine in a department is totally useless. It's nice for us to play with it but as it is, you know, it is not an aweful lot of good.

I: Very good. I mean, I've just enjoyed listening to your points that you've brought up.

JOU: Oh, I didn't know that I made any.

I: My personal view is....

JOU: It's still a novelty to me, really. Still a novelty. It haven't really affected my life very much, directly. Indirectly, I don't doubt they have. Banking and all this sort of thing which is now computerise and lots of other things. But in my own personal life, at home or even at school, they don't have much effect at all, at the moment.

I: Is there anything you want to add ?

JOU: No. That's it.

APPENDIX I (contd) :

2. Mr. Joachim (History)

Interviewer (I) : What I would like us to do in the first few minutes is to look at your personal views of computers in general. How do you see them being used in teaching as well. It's looking at what you think are their uses, whether there are good or bad memories of it... whether you've had past contacts with them and what sort of impressions has it had on you ? Has that changed ? If it has, why is that so ? So it is trying to trace really, your thoughts about computers in general and how you see it.

So the first question, specifically now.... when was the first time you became aware of computers ? Was it through other people, or was it....

Mr. Joachim (J) : In terms of teaching or in general ?

I: In general. In computers in general.

J: I suppose at school, through my own science lessons; television...

I: When you were a student ?

J: Yes. My school days.

I: You had computers then already ?

J: Yes. My school had a very early... Olivetti is it ? Cause they use to call it Olive ! Fairly small group. They did it at "A" level, I didn't do it but a friend of mine did it, and they went on to do it at University, whatever. There was no computer "O" level. I think we got it at "A" level. So I wasn't terribly aware of computers at school. One was more obviously aware of computers in general.

I: That sort of computer, was it a sort of a minicomputer that was portable ?

J: From what I can remember, yes.

I: So what were your impressions of it ? The first impact that you had ?

J: What in school ?

I: Yes, with the computer.

J: Totally non-existent really because it had nothing to do with me, and one new that it existed and one is not using it. That's about it. Well at first I had a slight interest, you know... how is it working... press a few buttons... but that's it.

I: What sort of interest...

J: Well what was it, I mean. You hear so much about computers I suppose and... what seventeen to actually see one, to see how it works... nothing more than that.

I: And when you tried it out...

J: No. Just in and out. That was it.

I: Have you had any more contact with computers since ?

J: No. none at all.

I: So you went through teachers' training college ...

J: No.

I: ...or how about here ?

J: Only the fact that: (a). I know that the school has them and the occassional read-out from the computer that we have been given. I've seen...when I first came we were shown a computer and that's about it. So...minimal.

I: Who showed this to you ?

J: Mr. Bohr. There was a group of us when we went and were shown "This is the computer. Isn't it nice. Don't touch." General programme..I think..which one is normally too busy to actually partake in.

I: What programme was that ?

J: They run a... what is it... departments were given an opportunity for learning about computing with Mr. Bohr after school. I invariably had too much to do or whatever.

I: During the time when Mr. Bohr said "This is the computer", did he say much ? What did you think about it ?

J: Yes. The odd sort of thing like this does that and generally sort of introducing its characteristics as a whole. I think that's about it. I don't know. First not being scientific myself or being ...I mean if I touch anything two batteries and an elastic band, it breaks. So I don't tend to take great interest in... to a certain extent. So I wasn't exactly wildly enthusiastic, I'm not surprised, as another piece of machinery.

I: Do you normally shy away from anything that is electronic ?

J: Yes because I don't tend to understand it and I'm so ham-fisted I tend to break them so I can just about change a plug and that's the lot. No generally, like I said, I'm not that into mechanical. That kind of things.

I: How does that affect you in using other resources ?

J: Well I can now work a banda machine and I can work a overhead projector and a filmstrip projector, and that's about my limit. Film projectors are big things I don't touch those cause I can never work them out, so I tend not to. I don't tend to show a lot of films anyway in my teaching.

I: Didn't you see that by learning how to pick up using the filmstrip or OHP that the film projector is just another step. Or do you see it as very different ?

J: Another step ?

I: Another step of learning how to use another equipment.

J: That's it if I presume you had a go in the first place and recognising and going on to do that. Yes I suppose I might. But I don't. I just see them as a tool to be used in another area. It happens in my case to be teaching the point I want to be teaching. So I don't see it in that state. They are just inanimate objects to me... tend to drop them.

I: Do you see that for the computer as well ?

J: Yes.

I: Or do you see it differently ?

J: No, I just see it as a machine to be used by people... to whatever ends they particularly want to use it and not in any other context.

I: If say you felt that there was something worthwhile to use it for, do you think you will have the same problems like you will have in learning how to use the filmstrip and all ?

J: I think one would first, not knowing about a computer, one would have to get the confidence to use it. I mean with a film projector or an OHP it's sort of two buttons and a ...and the lot comes on and that's it. Well with a computer I think there is a bit more obviously to using a computer even if it's only say four or five steps more. And I don't think I will use it until I felt totally confident in being able to do that. And secondly, I wouldn't use it unless I felt there was some... it gave some urgent new dimension to my teaching. I mean if it were just.... I wouldn't go through all the

methods or processes of learning it just for say one half of the lesson which I would never repeat for another 6 months. It would have to be a fairly important "whac" to the course I'm going to teach in. Also, one has to know it to show to the kids, to show that "sir" does know what he is doing.

I: So you feel that it is important for you to show some confidence.

J: Yes.

I: You mentioned several things that may affect your ideas of whether you'll use a computer or not. Could we look at it in a little bit more detail ? You mentioned about having the confidence to use it. What do you mean by having confidence ? What does it entail for you before you have that confidence ?

J: Well to know how to actually use the machine. I mean that will seem to me to be important. I mean the ins and outs and the understanding of how the computer works. And I suppose, second, to have confidence that would actually achieve something that I was trying to get, some goal that I was trying to achieve with the students. And sort of general confidence that the situation will be a good learning and valuable experience. I think just to use the computer for computer sake will be a bit pointless.

I: You also mentioned that it should be an important part. What do mean by "whac" ?

J: When you use a teaching aid, not only must you see it as an important instrument to some goal. Like I tend to use a slide, like Henry 8th or whatever, so using a projector there is a very important element to some aim. And I suppose that the students can see that I'm using a slide and therefore a projector is important. Therefore I think the same applies to computers. If they can see that you're trying to achieve something through that then I think they tend to respond; and I think unless I saw that as being a viable situation, I won't use it.

I: How can you go about trying to find out whether that is viable or not ?

J: Well only by trial and error. I think also interest. I mean computers don't tend to interest me. So I'm not likely to rush out and jump up and down and do things to use it. Also time. That also will incurr time and costs on my side which I don't know I would... unless I was converted I suppose, believing that it would be useful I would actually partake of it.

I: How do you think one would go about solving or finding solutions ? Do you think there could be or should be someone who could help out with this problem ? You talked about interest. OK that is a very personal thing but apart from you saying "Well I must be interested" ....

J: Teaching is a very personalised thing. I think the opportunity should be there if anyone wants to use it, and if any member of staff wants to use it then the facilities and the teaching and all the rest of it should be there. But if the person doesn't want to use it, and I don't see why it should be particularly used, but to actually then to force it... it's like with the kids themselves. To actually make them to use it is a non-starter because you get a negative feedback. I suppose all you can do is to have an environment where the computer is seen to be good... to be a good thing. If the department as a whole is using it then obviously one would get encouraged that way. If one gained enough signals like you are going to get a scale 3 if you start using computers... those sort of signals. I don't know... if the kids started saying "can we use it ?" So presumably one might then start to look into it.

I: So you think you would start looking into it if the kids talk more about it?

J: Well I think that is the sort of things one might do but then also one must say yourself "well do I have the time, do I have the inclination to do it ?" I think that is where it comes down to the individual teacher. Because presumably, unless the individual teacher picks those up and converts them into a thought pattern himself, he is not going to bother. I think, for myself, you would have to go a fairly long way before I'ld start using it a general sort of sense.

I: Why is that ? Is it because of past experiences ?

J: No. Because I don't know how to use the computer. I think that's obvious. I don't know. If one obviously knew how to use a computer and have a lot of them then one would then use them. But from a History point of view, I don't see at the moment, even with a knowledge of computers, that would greatly change my... or would be used because, at the moment, the

programs for History for students aren't exactly brilliant. We have got one on Christopher Columbus which really one could type out and give to kids anyway. Just because it is produced on a picture instead of on a piece of paper, the actual work is no different. So unless there was challenging work for them to use then yes. But plus the other fact, one would have to say "well how much more do you use the computer and with whom and under what circumstances". That would obviously determine... Well at the moment, the school has the facilities to have it readily available so you have to pick it like the video presumably as a resource or consolidation piece of a particular work.

I: We have hit on quite a few things. Would it be alright if we go through it one by one in detail. You mentioned something, just in passing, that there was a lot of "that". Do you feel within the department that there is availability of the computer ?

J: Well I think that is that. If a Head of department is very keen (I can see so many departments slightly hogging their machine). Also, some Head of Departments are very into computers whereas the rest of the department aren't too keen, well that obviously will determine as well. It also depends on what kids you've got. If your head of department happens to have all the best groups, one might not get the chance to use the computer. Because unless you saw very deeply and understand the computer's capabilities, to actually put that across for say a very low ability group, that may prove to be a handicap, not necessarily. I'm not denying the possibility that lower kids could use it, but I think that might predetermine how you would use it. So I think there are a lot of factors there. I mean availability is an obvious point, but if one had say the ideal situation of 30 machines or something in the department then that wouldn't prove to be a problem.

I: Say if you were head of department and you want to encourage the use of computers, how will you help out the situation or the environment of the department to do so ? I mean you mentioned about hogging.

J: Well first of all, I think, my own view of the department... I think the first thing one would have to discuss very carefully in the department... is it viable; what costs are involved in using it as against other machines, other resources; does the department want to do it (I would have thought that it is pretty nonsensical, to a certain extent, for just one member of the department to have it). You could actually have one room and we can bring people there. So that is a departmental commitment. I think that would be important. And I suppose one would have to have a fairly... once the commitment is there, or to get that commitment, they might be saying "Oh I don't understand computers" so you may have to have some training backup courses... so if one had an interest, than one could develop it that way, but I mean that is if people or department were to actually see computers as being important. I doubt very much at the moment that computers are a very high priority. I mean, I think, we would be far more interested in exercise books and general sort of materials first. If and when money starts flowing back in again then we may start looking at it. I think also, one would have to consider the courses you are teaching so there comes a curriculum point as well.

I: I hope you don't mind but I really want to understand. I have spoken with other teachers as well within the department, and the impression that I get is that, with respect to the purchase of the computer, it has been a very personal decision by the head of department, and that no proper consultation was taken. Am I right in that ? Do the teachers in the department have a bad feeling then ?

J: Well. I don't know about all, but certainly eyebrows were raised that perhaps decisions were taken... "we are having a computer" and that's x amount of money, several... obviously a large amount of money was taken out of the department when for example photocopying money was not available or whatever.

I: So there was no proper consultation made and you felt that it should have been done ?

J: Well yes. I mean that's just a symptom of a way of running a department.

I: Trying to take an objective point of view, do you think there is a better way to encourage something or...

J: Yes

I: Why is that ?

J: Because I think that the antagonism that you can cause by just taking that out and introducing... "hey look what we have got" counteracts any good values that you might get particularly at the moment when one is scratching around for chalk and paper and photocopying and we need new books for this that and the other. And secondly, I think that there is the very democratic point that one should have a full discussion departmental wise. My department, until very recently, has not had that departmental approach. It's been very much sort of a group of people teaching history. Or at least that is what I would consider. It is not until recently that we have actually sat down and sat through, even discussing curriculum, and I think that is more important. I think the departmental approach must come through that.

I: Has that been done all along or only recently, this departmental approach ?

J: The department is growing. Because there was a lot of us coming in at once and the team-teaching has now only developed. People have made it clear that they want that type of approach. My view is very much the same.

I: But it just so happens that with regards to computers it was different ?

J: Yes. He didn't even tell. I found out about it outside the school.

I: Has he tried in any way then to suggest things for you to use ?

J: The only people I could see using it will be his top groups because invariably that's all Mr. Johnson gets. I mean that is how one could see it being used for because he has the interest. I mean we don't as a group, as a department. Margaret has interest but I don't know how far she sees it as being the greatest thing... and I certainly don't.

I: So really we have touched on the personal, the departmental... is there anything as well on the school level that would encourage or discourage computers ?

J: If there is plenty of computers and a line is developed from top high that computers are the greatest thing then presumably that may make you want to reflect... and if IST would come in, if conferences, if facilities, then that obviously will influence you... that type of thing. But unless that is there I don't see it happening here. So I can't see any other ways.

I: So you feel to a very large extent that information or awareness is a very important part ?

J: Yes, you have to raise one's consiousness of computers; and there's the question of how you actually raise that consciousness. I don't see it as being school based. Probably departmental, but even then, it is up to the individual teachers. If the teachers had the background where computers are not being... in his or her life then I should think it is even more difficult. Where as if, I mean Mr. Johnson is a very logical person, then it's probably more towards him. And he tends also to like being on the bandwagon.

I: Coming back again to what you mention quite often in your questionnaire this whole problem about time. I think I appreciate a little bit of the tensions with respect to time. How do you see that arising and how do you see yourself trying to cope with this problem of limited time. Do you see limited time as because of the timetabling, or personally or....

J: All sorts of things. I think it is difficult, if you want to ask about time.... They always say that the first three or four years are the worst. I think there is that from my point of view, the fact that one is starting afresh. Now time at the moment for me is better because I have now got a filing cabinet and half full of material which I know I can now say I have; whereas in the first term one had, for teaching, one had nothing. So time there is obviously very much more difficult at the beginning. But even now one has deadlines, one has kids to teach and time has to be allocated accordingly. And so I think it's costs and balance really.

I: Do you find that the department or the school can help out with that pressure ?

J: Oh yes. I mean if we had less percentage teaching time, ofcourse. At the moment I teach, I hope, three free a week ? Which is quite...

I: If you are lucky.

J: If you are lucky, quite; and no cover. If that is suppose to be your marking periods, that's ludicrous. It's a total non-starter. But also I suppose, departmentally, we have in the sixth form created time by the way we divided sixth form teaching with seminars and we make time here. That's better but when you are down in the lower group it's very much more harder to create...

I: So the team teaching has helped.

J: At the sixth form yes. I don't teach that but looking at it as a department yes. What saves me time is the fact that I do have the resources.

I: How does that save you time ?

J: Well by the fact that I don't have to keep on doing it. I've got it there. Like overheads. I always use non-soluble permanent pens. I mean you just got it there once you've done it. So that makes, saves time. And also I suppose what saves time is that when you get into the game after a while, you know the short cuts and the rules and you can do that and also I think you start off with a blaze of glory and off you go and very quickly scepticism sets in and you say "what the hell" and you don't do it. So you make time that way. But I think just the general pressures of teaching - the fact that you have got marking, the fact that you have got preparation be it minimal, it's still there; chasing up kids as a tutor one has a great deal of work there; just odds and sods that add up that bite into whatever you are doing.

I: Do you think there is also the aspect that time is what you see as priority?

J: I agree you have to prioritize. At the moment it's been set by exams. I mean one tends to work towards the exams - fifth years are on now, they take priorities for a while till they have left and then I go back down to look at the lower school that tends to be a priority; or priorities if I am interested in... I'm working on something with some of the kids and that becomes a priority.

I: So the priority has quite alot to do with exams and workschemes.

J: Yes.

I: So do you have any plans of using computers in your teaching ?

J: No. Not at all. Never even really considered it. If ever I were to use it, I think it will be fairly limited like I would use a tape recording, send some of the kids off and listen to that, or slides. I don't see it over shadowing everthing that I do. I'm still a fairly traditional teacher. I use the blackboard a fair bit but not to make them copy from it but as an extension of whatever else I'm doing. I tend to use textbooks a fair bit, I tend to use worksheets quite a lot and background sheets and anything else. But again as many stimulants are.... I see computers as nothing more than adding a further stimulant to whatever I am trying to achieve. So if I use the computer any way, it wouldn't be very much. But even then it is very low, so low a priority that it doesn't even reach the scale.

I: Do you have any notions as to whether it will have any use in teaching, and why do you think that is, or at present you just don't know ?

J: I'm sorry I'm not....

I: Whether computers can be useful in any aspect of your teaching ?

J: My teaching ?

I: Yes.

J: Well not having used them one would never know the results. If one had a challenging program to place on the computer, and one knew the results that it might have with a set of kids than yes, perhaps it might have some use in which case one might use it. But by and large, at the moment I'm not convinced. I think you have to be convinced of its usefulness but at the moment I'm not convinced by that and I'm not convinced that it would... because of that I'm not convinced of its priority within teaching, my teaching or at the level of teaching other than computer studies per se. I don't really see how, for example, Mr. Johnson is going to use it in the department, I mean his glorified ideas, but I don't see them coming off...

I: Why is that ?

J: Because I don't think this is what our department is interested. He is interested. I think the fact that he will use it, he will use it for his top groups as such.

I: But if he shows you a good program that is tried out...

J: I don't know I would then have to be honest. Because I don't know how to use it, but if I know how to use it ...I mean we come back to that point really. I think also the fact that it is a different type of ball game of teaching. It's a very.... unless you've got students who wouldn't smash the thing up and could generally come to terms with what the machine is because by using the machine you are setting up a different type of discipline, a different type of work ethic. One would have to change the perspectives of the teacher, of your own teaching. It's very much more non-formal and unless you've got kids that come to terms with that and work on their own, you've got problems because you are setting up a new, different... you could be setting yourself new problems.

I: Because it's a new way of teaching ?

J: A new way of teaching for the staff because you are having to deformalize to a certain extent your work and that could set up conflicts within the kiddies because they are not used to that.

I: Do you think it will conflict with you as well ?

J: Yes because my style of teaching is a very formal, very traditional style which I think the kids know what they are doing, you know what they are doing. With top kids, mature, top kids of any age, I think they can handle that change in formality, I think they can handle it. If you are talking about low ability I don't think they can handle it presumably. I don't know.

I: Can teachers handle it ?

J: Well they should be able to but I don't know whether they could. I mean, I'm not a terribly logical person. I don't know whether I could handle it.

I: Why must one be logical to be able to handle it ?

J: Well just from what I have seen, again this is based on the idea of a program, writing a program that is in logical steps. Presumably, I mean an outsider's view, to actually sit down and do that sort of thing, you have to have a fairly precise sort of mind.

I: Which is the question I like to ask. You talk about "I don't know how to use it ". Are you refering to the fact that... what do you mean by using it ? In terms of programming it or being able to switch it on ?

J: Well both, presumably. I mean on the lower level there is the idea of where is the plug; and then if one is going to use it, one would want to use it in a meaningful way. It's all very well buying a program.... I mean on one level you just buy a program, shove it in and know how to use it. Well fair do if that's all what you want out of it. But I am the type that if I want to use it, I want to start improving things and then having to write. I could probably do the first relative things but I don't know if I could progress beyond that.

I: And you feel that is important. It is very important to reach this third level of being able to program.

J: Well I would thought so or there is not much... unless you are relying on another... it's just... otherwise you might as well use it... why bother because it's just a television screen with something you are plugging in. Maybe useful, I don't know. But on the other hand... also, if something went wrong and the kiddies did something and you did not know what was going wrong, you may end up smashing everything and end up looking like a right burke infront of the kids. So I mean it is this bluff and counter bluff - "Oh Sir knows what he is doing" is very important. And if the kids do something, sir would like to know what they doing. So I think there is that point.

I: And you think that if you know how to program, that will help that ?

J: Well I would have thought so because you know the various bits, the parameters and what the machine can do. Which I would have thought would be important.

I: If someone were to have a few sets of good programs, teach you how to work it, it's really well designed so that you can't go wrong, without knowing any programming, would you be encouraged to use that ?

J: Well depends on what kids I will be using it with - whether I saw it as being beneficial to drop the.... of a lesson or teaching plan or whatever I was doing. If I saw it as being beneficial, yes. Yes, maybe, I might. One would have to see it and think about it. I mean one could argue that it is beneficial just to let the kids to have a go on it anyway. It will get a different perspective of what you are doing in which case there may be an argument for doing it. But I don't know whether even then I would... I would have to think about it.

I: Ok. Well thank-you. I had realised that I have been quite gruelling.

J: No I have enjoyed it.

I: Could you, if you have any, summarize in a few words what your views and opinions of the use of computers in your teaching are ? Whether it's positive or negative ? In a few sentences.

J: Well...use, non-existent.

I: Future use ?

J: Minimal.

I: Why is that ?

J: Through lack of motivation to use it. Lack of motivation from (a). I don't know how to use them (b). Lack of opportunity to use them because of scarcity (c). Priorities through other objectives and teaching methods, I suppose. And until those things change, one wouldn't consider. Well at least I wouldn't.

I: And you think that the change will only come about externally - someone brings a greater awareness or...

J: Yes.

I: Because you won't do anything by yourself.

J: Yes. And even then I think it would have to be a fairly imaginative thumping experience for me to change me. And I think also that I have to be convinced that the change will be beneficial and long lasting as well.

I: Beneficial in what sense ?

J: Beneficial to me as a teacher, and to me as a person I think as well to a certain extent, cause I think that what one does is important to the kids. Beneficial to the kids, beneficial to the staff, the department, the curriculum, all sorts of areas, bits and pieces. That it is not just a gimmick. To a certain extent also the kids see it as gimmicky or could see it as gimmicky.

I: OK. Anything else ?

J: No.

I: Thanks.

APPENDIX J : Organisational Structure, Perceived Roles and Relationship with Outside Bodies in Barnaby Comprehensive.

1.0 INTRODUCTION

The background to the organisational structure, perceived roles and relationships of Barnaby Comprehensive with outside bodies was achieved via interviews with several staff including the headteacher, several heads of houses, heads of departments, and the school counsellor. The management (communication and authority structure) of the school was described pictorially by the Headteacher as concentric circles, with the Headteacher in the centre, and with ever increasing circles of Deputy Head Master and Mistress, Senior Masters, Heads of Houses and Departments, and then the staff. This representation is shown in Figure J.1. The Headteacher saw himself to be directly accountable to the Board of Governors and in-charge of the day to day running of the school. This was delegated to the Heads of Departments who were responsible for the coordination and administration of the departments.

The external institutions that affected and influenced some of the decisions made in the school as perceived by the Headteacher included the Local Education Authority (LEA), the parents of pupils, the pupils themselves, and also the community around the school. The extent of such influence was, according to the Headteacher, dependent on how strong each of these groups were in imposing their views and opinions on the school.

2.0 PERCEIVED ROLES

2.1 Heads of Departments

Each of the heads of departments perceived themselves as having different roles within their departments, with different orders of priority attached to these roles. The following is a resume of the different areas and roles that the various heads of departments saw themselves as having:

1. Responsibility. The heads of departments regarded themselves as directly responsible to the Headteacher for their departments, i.e. "they carried the can" when anything went wrong in the departments. They saw themselves as representing their departments, and at times, having to be public relations officers for their departments.

2. The Staffing of Departments. They were the staff members who had to decide (with the Headteacher) on the teaching commitments of each teacher within their departments, having first considered the needs of their pupils, staff and their departments as a whole. The Headteacher however had the final say, as he was the one who did the final timetabling and had to fit in all the different staff requirements and deployments within the school.

3. Finance. The heads of departments saw themselves as chief negotiators for the allocation of funds from the school to their departments. They would have to request sufficient funds for the running of their departments. Normally, the heads of departments would suggest and receive suggestions from staff members in their departments as to how much money was needed and for what purpose it would be used. A major portion of the budget within a department would be spent on the allocation of resources, including audio visual aids, books, worksheets, stationery etc.

4. The Curriculum. The heads of departments would have to decide on the curriculum or syllabus to be used for each of their years. Most of them preferred to work with the rest of their staff as a team in the planning of courses. They however would have to oversee the entire curriculum used in the department and were ultimately responsible for the types of public examinations taken (and hence the most appropriate syllabus to be used).

For the 4th, 5th and 6th years, the syllabus was fairly well determined because of the commitment of the school to "O", "A" and CSE level examinations. The main area of influence that heads of departments could have was with the 2nd and 3rd year curriculum. Deciding on the best combination of syllabus was crucial as it would influence the pupils' interests and future choice for their "O" or CSE level subject options.

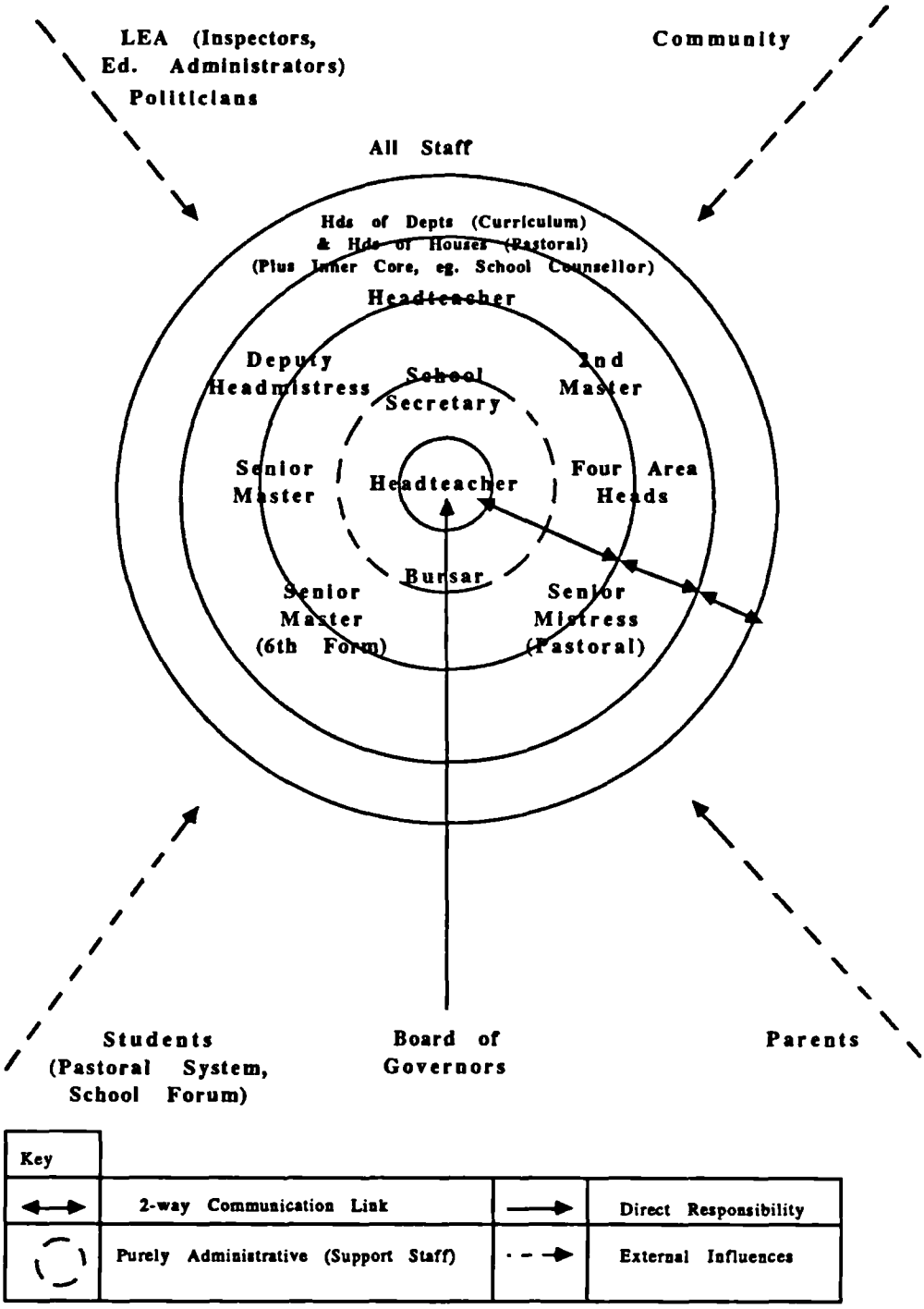

FIGURE 7.1 : The Organisational Structure of the School as perceived by the Headteacher

5. Assisting Staff in the Department. The heads of departments were directly responsible for assisting their staff in the areas of teaching, staff development and discipline. Most heads of departments perceived the area of assisting teachers to improve their teaching as being a very difficult and tricky area. According to one of the heads of department, action was only taken when a comment or complaint was received from another teacher, parent or pupil with regards to a teachers' teaching (often poor teaching). Others admitted that more attention was given to teachers who were on probation and less attention given to those who had been teaching for several years. The heads of departments perceived themselves as needing to be experts in their subject areas whom staff could refer concerning matters on their subject. They felt that they had to keep up-to-date with whatever was going on in their subject area including teaching methods, strategies, equipment etc.

An essential role most heads of departments perceived was in creating a climate of discussion amongst their staff members. They believed that there should be both formal and informal discussion among teachers on any aspect of their teaching, or any questions or problems encountered. They believed that their staff needed to know the facilities and resources that were available within the department and the school to help them in their teaching. A fair amount of assistance and attention was given to part-time teachers as they needed to be constantly informed of the latest decisions taken within the department and the school.

The heads of departments also assisted their staff in the area of pupil discipline. This responsibility was shared with the heads of houses and there was no fixed line drawn as to who should take full responsibility.

6. An Innovator. Heads of departments saw themselves as being persons who "made things happen". They felt that they continually needed to innovate, improve their departments and motivate their staff. They perceived that they should actively encourage their teachers to go for further courses (one day, half-day, weekend or week-long conferences; part-time courses etc.) and be prepared to consider their staffs' new ideas and suggestions. One of the heads of department felt that he needed to, as he said, "allow things to happen and even to go wrong so that my staff would learn from it".

7. An Administrator. They perceived that they needed to keep their department "ticking over" so that everyone was reasonably happy. They saw themselves as making conditions conducive to getting the best teaching out of their staff and pupils, but as one head of department complained, "Administration takes a lot of time".

2.2 Headteacher

The Headteacher saw himself as having different roles in different areas of responsibility. He perceived himself as having different functions in respect of his attitude towards education and the curriculum, in his relationships with those around him, and in the organisation of the school. This can be summarized diagrammatically in Figure J.2.

With respect to his attitude towards education and the curriculum :

The Headteacher saw himself to be a/an

Innovator	Implementor	Team Leader
* Being aware of the latest issues (e.g. nationally, university level, HMI). * Encouraging staff to attend suitable conferences, courses. * Calling on Inspectors to look at specific departments and give a report as to how thedepartmen could be improved.(He has done this 3 times already).	* To be able to combine the latest educational issues as perceived by the Headteacher with what teachers could do.	* Instilling confidence in teachers. * A "motivator".

With respect to his relationships with others :

Relationships with

Teachers	General Public	Governors
* Always being available for advice. * Every two years, he tried to interview each of the staff and discuss future career plans of the teacher.	* Looking after the professional cause of teachers (awkward cases, pressure from authorities, parents, politicians etc.). * Backing teachers up.	* Being accountable to them.

With respect to how he perceived the organisation of the school :

Organisation

Administration	Running of Depts	Timetabling
* Accepting the increased working stress in the profession. Hoping to tackle this by providing an efficient organisation and making practical help available, and not by reducing teaching hours.	* "Keeping an eye" on the department. * Walking round and picking up pupils' bks but not 'inspecting' or sitting-in on teachers' lessons.	* Ensuring that each teacher had a fair amount of workload but being aware at the same time that it was very difficult to please everyone.

Figure 7.2

3.0 PASTORAL CARE

The pastoral care of the school was achieved mainly through the division of the school into houses and tutor groups, and by a School Counsellor who was also a full-time teacher and member of staff.

3.1 Heads of Houses

The school was organised into six houses with about 250 students for each house. In Barnaby Comprehensive, the houses were divided vertically so that there would be a balanced number of pupils from each year and hopefully a balanced number of boys and girls in each group. This was found to be very useful as the older pupils would help the younger ones, and the younger ones could look up to, or get support from, the older pupils.

Each house was then further divided into 7 tutor groups, each looked after by a tutor who was a member of staff. These tutors were expected to build up a close relationship with the pupils in their tutor group and to guide them when needed. Each tutor was thus responsible for an average of 30 pupils for the 4 years that they were in school.

The school houses were taken charge of by heads of houses who, apart from their own full teaching responsibilities, devoted a lot of their time to the running of their houses. The main role of the head of houses was to act as coordinator and senior counsellor of their house. They were seen to be the pastoral leaders of the school and they looked after the general welfare, academic progress and discipline of their groups.

If there were discipline problems which could not be solved in the class and had more fundamental problems related to them, the heads of houses were called to deal with them. For example, it was normally the heads of houses who followed-up students who had been placed on detention to find out the reasons why and to see if anything could be done to help these pupils. The house system was also used to implement school policy with regards to general school rules like adherence to school uniform. If there was a slack in the enforcement of any one of these rules, the heads of houses would bring it to the attention of their tutors who in turn would pass it on to their pupils.

The heads of houses were also the organisers of all inter-house activities. They were normally delegated to other teachers within the house (this was especially so with regards to sporting activities) who in-turn delegated them to responsible students (for example, student head of house). The heads of houses were also responsible for the organisation of House trips, for example, skating, school visits and activities, and also the collection of money involved in all of these activities. Despite the extra demands placed on the heads of houses, they usually felt that the satisfaction of their job recompensated the additional time and energy spent. As one head of house commented, "I'm happy in the job I'm in.... There are times when the pressure feels great but there are rewards that make the job worthwhile".

As heads of houses, they were not directly involved in curriculm development (although they could be as teachers in their departments). If however there were problems with pupils choosing suitable options, then the heads of houses were sometimes called upon for advice or to advise the pupils. They were also involved with any developments involving cultural pursuits which affected the entire school.

3.2 The School Counsellor

The School Counsellor was seen not only as a counsellor in the school whom anyone (both pupils and staff) could approach for a listening ear, but also as the liason officer between those who needed counselling and those with counselling expertise outside of school. This was becoming more so not only as a result of the growing number of pupils in the school but also because of a growing percentage of pupils who required counselling of a more varied nature and complexity.

She worked closely with the Education Welfare Officer who was responsible for the pupils in their homes and with their parents. Outside of school, the School Counsellor formed a link with the various social and counselling services of the County. She was in constant contact with social workers, educational psychologists, educational psychiatrists, probation officers and also the Police. On occasions, she was also involved with the Divorce Courts and the Juvenile liason group.

The School Counsellor was also a liason officer within the school. She was responsible for providing a channel of communication between the pupils that needed help, and with tutors, heads of houses and senior staff (including the Headteacher who saw the School Counsellor for half a period every week). The School Counsellor was also responsible for the administration necessary when a pupil was being considered to be transfered to a special school, and for the medical check-ups and arrangements made in the school for all pupils.

The responsibility of the School Counsellor in Barnaby Comprehensive fell on a full-time teacher who had only 6 non-teaching periods available to do such counselling. When the appoinment of school counsellor was first made ten years ago, it was a near full-time appointment, but gradually this deteriorated due to educational cuts until her teaching time now occupied the main part of her timetable. As such, most of her counselling involved working before or after school. With her present heavy teaching workload, she felt frustrated as there was not the time needed to provide a full counselling service. This had led her to try to delegate the task, as much as possible, to the tutors and heads of houses. It was only when the needs and the skills required were much greater that she would step in or call outside expertise.

The School Counsellor was involved with curriculum development in the school in only a small way. For example, in the 4th year, plans were under way to initiate a new course entitled "Life Skills" where the School Counsellor with the Remedial, Careers, and Social Studies teachers combined their expertise to formulate and teach this new course. The topics covered in this course would not be covered in any other subject areas. The School Counsellor however was not involved in anyway in the introduction of computers into the school.

4.0 RELATIONSHIPS WITH OUTSIDE BODIES

4.1 The Diocese

Being a Church of England School, the Diocese played a major role in Barnaby Comprehensive. In one sense, the Diocese could be seen as the Custodian of the school, with delegated responsibilities given to the Board of Governors. With the Board of Governors, the Church was totally responsible in three areas of the running of the school :

1. The appointment of all staff (including the Headteacher). Legally, all the staff in the school were employed by the Church but paid by the Local Education Authority (LEA). The Board of Governors also possessed the legal power to remove a Headteacher if he was seen not to be discharging his responsibilities well or was causing the entire school to fail in fulfilling its functions.

2. The content of the curriculum. The Board of Governors would decide (with consultation from the Headteacher and the teachers) on the range, types and levels of subjects offered in the school. The actual implementation of them was however delegated to the Headteacher and his staff. The Board of Governors would periodically assess the school to see that it was meeting the needs of its pupils in preparing them for society.

3. The extenal maintenance of the school buildings. The Church owned the school (i.e. the land and all the structures on it). The Church subsidized 15% of all work done to the fabric of the school (for example, maintenance of the external walls), while the other 85% was borne by the State.

Due to financial constraints, the school had looked to the Church for more financial support than its statutory obligation and the Church was thus taking a greater interest in the running of the school. With the Headteacher of the school being an ordained minister, the Church had a more than ordinary contact with the school (it was however not compulsory for the Headteacher to be ordained in a Church of England school). This contact was more on an informal basis and due to the personal interests of the Headteacher to the school and to the Church. The local vicar was also encouraged to contribute to the religious teaching and pastoral care of the school.

4.2 Board of Governors

In Barnaby Comprehensive, there were altogether 12 elected Governors, with the Chairman of the Governors presiding over them. Four of these Governors were appointed by the County or LEA; four by the Diocese, and four from the local Deanery (the local church "parishes"). It was a policy of the Diocese that within the latter eight Governors appointed by the Diocese or Deanery, a number of them should be parents of pupils in the school. The Governors met every

once a term where official matters of the school and items concerning the school were discussed. It was during these meetings that the Headteacher kept the Board of Governors informed of the activities in the school.

The main responsibility of the Board of Governors was to look after the general well-being of the school. Apart from those mentioned above, this responsibility encompassed four other major areas :

1. Overall policies of the school. For example, they would decide on whether the school should be a 12-16 school or a 12-18 school.

2. The overall condition and adequacy of the school buildings (and not just the external repairs). It was the Board of Governors that ensured that there were proper and sufficient facilities provided by the school for the teaching of its pupils and the pupils' total exposure to school-life.

3. The extra-curricular activities of the school. The Board of Governors played an active part in supporting the various extra-mural activities of the school, from school plays to the more formal functions of the school (for example, Speech/Presentation Days). They provided the official backing in the various functions organised by the school.

4. The general ethos of the school. They closely watched over to see that things were going on well and smoothly, and that generally, there was a "good feeling and atmosphere" about in the school.

The Board of Governors in Barnaby Comprehensive was seen to be generally active and supportive. They played more of a supporting role in the school than an authoritative role. With respect to the introduction of computers into the school, the role of the Board of Governors was mainly supportive. Individual Governors were however involved in providing advice and encouragement with the Board of Governors providing its official backing.

4.3 Local Education Authority

The Local Education Authority (LEA), like most other LEAs, were officially involved with the school in three areas :

1. The payment of staff salaries. It was the LEA that allocated the number of salary points to each school. The school would then have to decide on how it would distribute these points out among its posts. Although the actual appointment of staff was made by the Board of Governors, this was normally made in agreement with the LEA especially for the appointment of senior staff (i.e. Scale 3 and above).

2. The internal maintenance of the school building. For example, internal paintwork, up-keep of classrooms etc. It was the LEA that formally ensured that maintenance work inside the school was done according to safety requirements and standards.

3. Teaching standards. The LEA was responsible for ensuring that the school was efficiently and effectively carrying out the curriculum that the school proposed to do. This was done mainly via the LEA's subject inspectors who ensured that curriculum and teaching standards were maintained.

Although these areas of responsibilities entailed a more formal contact with the school, most of the contact with the LEA was informal and consisted of good relationships between individuals in the LEA and teachers in the school.

The LEA used to play a more active role in the school during the 60s when they were more involved with curriculum innovation in the school. However, at the time of the research (and mainly because of the spending cuts that LEAs were going through), they were less involved in Barnaby Comprehensive. Most of the LEA's resources were spent on bigger policy decisions (for example, school closures, staffing deployment). LEA inspectors were now more involved with reviews, fact-finding missions and reports to rationalise educational spending than with individual schools. Actual curriculum development would now normally take place via the local teacher centres.

4.4 The Parents Association

The parents of the pupils in the school were linked to the school via the Parents Association (PA). It should be noticed that it was not called the Parents-Teachers Association as teachers of the school did not play a direct part in the association. It was a conscious decision by the Headteacher that teachers in Barnaby Comprehensive should not be directly involved in the Association, although opinion within the association as to this differed. The teachers were however represented by one or two appointed teachers in the Parents Association's committee (mainly via the Headteacher and another senior teacher).

The PA was headed by a committee which comprised of the Chairman (who was the Headteacher or his representative), the Secretary and Treasurer (who were elected by the committee from amongst themselves), and two parents for each pupil-year in the school. The PA committee members were elected during the AGM of the PA which was held once every year. The normal attendance of an AGM was about a hundred people. The PA committee were also encouraged to attend all of the Parents Evenings at the school to forge closer links with the parents. They also helped to make the coffee and tea (with pupil-help) for parents and staff at these evenings.

The role of the PA in Barnaby Comprehensive was mainly supportive. Their main contribution was in the area of fund-raising, or in providing an informal opportunity for parents to meet each other and with teachers and friends. This took the form of a social evening organised about once a term. The attendance to these activities was generally only fair compared to the actual pupil population size (and hence parent population size) of the school. There were the active few (including teachers) who supported most of the activities but a large majority of them were uninvolved. Most of the activities organised by the PA were for the raising of funds for the school to meet any additional expenditure that it might need or want for the coming year. This, in fact, was one of the chief roles that the PA played in the school. Every year, the PA would ask the school as to whether there were any financial targets which the PA could concentrate all their efforts on. Activities like fairs (about once a year), jumble sales (once a term) were then organised to raise the required sums of money. In this way, the PA had been able to provide the added financial boost (for example, to provide for certain textbooks urgently required by the school, a school minibus, certain sports facilities and equipment, and also some of the finance for the purchase of computers in the school). The money raised each year by the PA amounted to about £1,000 each year which had been of substantial help to the school.

The PA also provided the opportunities whereby willing parents could provide assistance or expertise in certain specific areas. For example, certain parents volunteered their help in providing advice for the purchase of computers (including one of the parents donating a disc drive system to the school); or in providing job places for the school's "work experience" scheme. In turn, the school tried to organise events like open evenings (where parents would become pupils in mock-up classes) or informal discussions about once a year/two years which would inform parents of some of the educational issues involved in the school. The PA could only provide opinions for the running of the school as final decisions were made solely by the Headteacher and his senior staff.

4.5 Local Employers

The main contact that the school had with local employers was through the innovative scheme of "Work Experience" introduced by the school for all its 5th years and its Lower 6th Foundation course. The scheme involved a week's work in a firm to provide pupils with a taste of what working life might be like in the firm. The "work experience" scheme was well administered by the careers advisor and the majority of pupils appreciated the opportunity of seeing a different perspective to that of school life (albeit a very limited view).

In all, about 300 fifth year and 60 Lower sixth work experience placings were provided each year. About 100 companies offered places for those pupils and contacts were made via the careers advisor, parents, the careers office, the pupils themselves, or by ringing through the yellow pages. The Careers advisor, or a member of the teaching staff, would attempt to visit as many of the pupils on work experience to see that they were taken care of and not exploited. This also promoted good relationships between the members of staff at the school and the firm.

Employers appreciated the fact that the school was concerned for the future of its pupils and they would like to help out if they could. Some of the employers had also expressed (to the careers advisor) that they were impressed with the school because it possessed computers (although they did not ask what the computers were used for).

APPENDIX K : The Case-Study Worker

The case-study worker is in his late twenties. He was born in Singapore (which was a former British colony and whose infrastructure and educational system is modelled after the British system). He finished his primary and secondary schooling in Singapore where he successfully completed his "O" and "A" levels. Before coming to the United Kingdom, he had to complete two and a half years of compulsory National Service. This he did with the Singapore Armed Forces where he became a Commissioned Officer and a lecturer in the Officer-Cadet Military Academy.

The case-study worker arrived in England to do a undergraduate course in Engineering. This consisted of a four-year "sandwich" course with an industrial training year in the 3rd year of his studies. The course included a general training in electrical/electronic, mechanical, chemical and civil engineering with a sizeable portion devoted to management studies (for example, marketing, production, finance, and personnel management). His industrial year training was in an electronics firm which manufactures data-logging systems and are agents for microcomputers. He is, at present, an associate member of the Institution of Electrical Engineers (IEE) and also a member of the United Kingdom Council for Computing Development (UKCCD).

Although the case-study worker's background and training is not in education or in the social sciences, his interest in education and in teaching started back in Singapore when he was providing private tuition for his friends doing "O" levels (while he himself was doing "A" levels). It grew when he became a lecturer in the Officer-Cadet Military Academy. This was after successfully completing a short teacher-training course at the School of Military Instruction. As a lecturer in the Military Academy, he was teaching basic military skills and was also heading the Military Service Writing Specialist Instructional Team. This involved both lecturing and developing and improving the existing curriculum.

In the United Kingdom, he was able to obtain DES recognition as a qualified teacher in secondary schools (on probation) and was able to teach part-time in a comprehensive school in England. This was mainly teaching Physics at 3rd and 6th form level, including a basic computer literacy component in the summer term for the 3rd year group. The experience proved valuable as it gave the case-study worker a glimpse of the educational system and the problems (especially pastoral and disciplinary problems) and issues that are found in a comprehensive school in England.

The case-study worker's interests were firstly, with how and why things work (which included the dual fascination of the mechanics and impact of machines, especially electronic equipment and computers, and the dynamics and management of group interactions in society); secondly, with education; and thirdly with people. These interests led him to do a postgraduate research in the introduction of computers into a school. This research had a bias towards the practical dynamics (the "whys and hows") of the actual implementation of the innovation. The more the case-study worker looked into the reasons and processes involved in the adoption or rejection of innovations in schools, the more he was led to look at the organisation of the school, the interactions of the people within the school, and the interplay between the innovations and those confronted with the innovations. The case-study worker does not however claim to be a social-scientist. On the contrary he, like an engineer working on an engineering project, would like at the end of the research to be able to provide some practical suggestions and management strategies as to how computers could be successfully implemented in a school.

Finally, the case-study worker has just started full-time employment as Research Fellow in Computer Assisted Learning at one of the Universities in the United Kingdom. This includes lecturing, courseware design and development, and research into the educational issues of Computer Assisted Learning.

APPENDIX L : Example of Department Financial Claim Form

Department _____

For information: Allocation 1982/83 was _____

SCHOOL - FINANCIAL YEAR 1983/84

Please indicate below your essential requirements for the next financial year - and then add any items that you would find most useful for the efficient running of your department, including an up to date summary of the text book situation in your area of the curriculum.

Goods Description	Cost
A. Essential	
B. Very useful additional equipment	
C. How many books required to have at least one book for each student in your subject?	

APPENDIX M : Summary Figures of Teaching Methods and Resources Used.

TEACHING METHODS USED (IDEAL SITUATION) : SCIENCE DEPARTMENT

TEACHER	TEACHING METHODS MENTIONED	LEVEL OF INVOLVEMENT OF TEACHING ACTIVITY			PUPIL INVOLVEMENT				REASONS				
		Basic Level	Active Before Lesson	Active Within Lesson	Active Within Class: Doing	Active Within Class: Writing	Passive Within Class (Min. Involve)	Outside of Class	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside sch
CANO	Individual Practical Work.		✓		✓				Actual participation promotes enjoyment & understanding.				
JUNE	Discussion based on visual mat.		✓	✓	✓				Variety Stimulating Interesting	Enough knowledge & experience & interest to use these methods successfully.			
	Lessons taken by & prepared by pupils.				✓								
	Roleplay.		✓	✓	✓								
	Question & note-taking.	✓					✓						
MR ADO	Practical Work.		✓		✓				Hands-on experience is beneficial.				
	Open-lab concept.		✓	✓	✓				Pupil will be able to carry-out relevant work when they reach that stage of work.				
	Small-group teaching.								Social & pastoral considerations.	For control & discipline.			

FIG. 5.1

TEACHING METHODS USED (REAL SITUATION) : SCIENCE DEPARTMENT

TEACHER	TEACHING METHODS MENTIONED	LEVEL OF INVOLVEMENT OF TEACHING ACTIVITY			PUPIL INVOLVEMENT				REASONS				
		Basic Level	Active Before Lesson	Active Within Lesson	Active Within Class: Doing	Active Within Class: Writing	Passive Within Class (Min. Involve)	Outside of Class	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
CANO	Deconstra -tions.		✓	✓			✓			Quicker.	Cheaper. Uses less amount of equip.		
JUNE	Dictation of notes.	✓					✓				Amount of prep. time limited for prod. of new methods & ideas for all 11 or so grps.		
	Roleplay.		✓	✓	✓							Depends on ability & age of group eg. not suitable for 25 CSE pupils.	
	Simulations.		✓	✓	✓								
MIKADO	Talk & Chalk.	✓					✓				Limited time to set up apparatus & equipment.		Parental expectn. Constraints of syl meeting exam.board requirements.
	Practical demonstrations.		✓	✓			✓						

FIG. 5.2

TEACHING METHODS USED (IDEAL SITUATION) : HISTORY DEPARTMENT

TEACHER	TEACHING METHODS MENTIONED	LEVEL OF INVOLVEMENT OF TEACHING ACTIVITY			PUPIL INVOLVEMENT				REASONS				
		Basic Level	Active Before Lesson	Active Within Lesson	Active Within Class: Doing	Active Within Class: Writing	Passive Within Class (Min. Involve)	Outside of Class	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
MALORY	Lecture. Seminars. 1-1 Tutorial. Indiv. work. Fieldwork. Archive work. Peer learning.	✓ ✓ ✓ ✓ ✓	 ✓ ✓ 	 ✓ ✓ ✓ 	 ✓ ✓ 	 ✓ ✓ 	✓ ✓	 ✓ 	6th form. Depends/vary with yeargrp aptitude indv. point of devel. Through as many senses as poss. Each method has something unique to offer.				Depends on subject requirements.
RIDLEY	Discussion. Question & Answer. Fieldwork.	✓ ✓ 	 ✓	 ✓	✓ 	 	 ✓ 	 ✓	Want to know what they understand & want to devel. Keeps them on their toes. Particularly for low ability.				
JOHNSON	Team Teaching. Fieldwork. Problem Solving.	✓ ✓	 ✓ 	 ✓ 	 	 ✓	✓ 	 ✓ 	Develop spec skills & abilities. Interesting. Variety.	Staff dev.			
JOACHIM	Fieldwork. Project work. Group work.	 	✓ ✓ ✓	✓ 	 ✓	 ✓ 	 	✓ 					

FIG. 5.3

TEACHING METHODS USED (REAL SITUATION) : HISTORY DEPARTMENT

TEACHER	TEACHING METHODS MENTIONED	LEVEL OF INVOLVEMENT OF TEACHING ACTIVITY			PUPIL INVOLVEMENT				REASONS				
		Basic Level	Active Before Lesson	Active Within Lesson	Active Within Class		Passive Within Class (Min. Involve)	Outside of Class	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
					Doing	Writing							
JOACHIM	Question & Answer. (Discussion)	✓			✓				Inquiry based. Interest. Depends on ability level(the lower the level, the more structured the work. Better understdng.	Interaction gained betw staff & class. Survival. Preparation time (an"awful lot"). Ease of teaching.			
MALORY	Lecture (with seminar).	✓					✓			Personal stamina (or lack of it). Too teacher-based. Too little individualised learning.	Lack of resources. Booking equip.	Pressure of timetable. Difficulty of moving around in the sch building. Ethos of school.	
	Visit		✓	✓				✓		Very occasional.			
RIDLEY	Essay-writing	✓				✓			Exams are inpt to kids				Part of continous assessment of exam.
	Question & Answer.	✓					✓			Not possible for certain grps 'cos of class control.			Sometimes not poss. bcos of having to get through exam work in time.
	Fieldwork.		✓	✓				✓		Very occasional 'cos tricky to org.	Difficult to obtain cover from other staff.		
JOHNSON	Team teaching. Field work. Problem Solving.	✓ ✓	✓	✓		✓	✓	✓		Restricted by Time	Restricted by Money Best philosophy for dept.	Restricted by Timetabling	Satisfy obligations for public exams.

FIG. 5.4

TEACHING METHODS USED (IDEAL SITUATION) : GEOGRAPHY DEPARTMENT

TEACHER	TEACHING METHODS MENTIONED	LEVEL OF INVOLVEMENT OF TEACHING ACTIVITY			PUPIL INVOLVEMENT				REASONS				
		Basic Level	Active Before Lesson	Active Within Lesson	Active Within Class: Doing	Active Within Class: Writing	Passive Within Class (Min. Involve)	Outside of Class	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
CONSTANCE	Simulation Games.		✓	✓	✓				Children learn by doing. Promoting an inquisitive & enquiring mind. Teaching how to look & marvel at the world.				
	Role playing.		✓	✓	✓								
	Fieldtrips.		✓	✓				✓					
MARG										"I can't imagine a situation of no constraints."			

FIG. 5.5

TEACHING METHODS USED (REAL SITUATION) : GEOGRAPHY DEPARTMENT

TEACHER	TEACHING METHODS MENTIONED	LEVEL OF INVOLVEMENT OF TEACHING ACTIVITY			PUPIL INVOLVEMENT				REASONS				
		Basic Level	Active Before Lesson	Active Within Lesson	Active Within Class: Doing	Active Within Class: Writing	Passive Within Class (Min. Involve)	Outside of Class	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside sch
CONSTANCE	Talk & Chalk.	✓					✓		Get children to work out info with you (for more able groups)	Sufficiently at ease with info & subject & so much easier to put across.	Not the best org. dept. Often you can't find the info you want. Easy-going dept. -good relationships.	Red tape to go through to org field trips eg. book out minibus, permission from dept, Ok with rest of timetable, signing out, cost, org well in advance. Frustrated when suggestions made to "higher powers" are not taken. Good naturedness of staff taken for granted.	Constraints of syllabus & curr. (no time to do fieldtrips & games).
	Exercise work. (Problem solving)	✓				✓			Creates understanding.	Feedback			
	"Busy work" ie. make notes on...	✓					✓			Desperately tired. Haven't had time to prepare lesson. Just want the kids to shut up. Guilt complex. Getting set in your ways. General switching off.			
MARK	Simulation games		✓	✓	✓					"The main problem is to create an interest in your subject matter to the pupils".			

FIG. 5.6

TEACHING METHODS USED : MATHEMATICS DEPARTMENT

TEACHER	TEACHING METHODS MENTIONED	LEVEL OF INVOLVEMENT OF TEACHING ACTIVITY			PUPIL INVOLVEMENT				REASONS				
		Basic Level	Active Before Lesson	Active Within Lesson	Active Within Class: Doing	Active Within Class: Writing	Passive Within Class (Min. Involve)	Outside of Class	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside sch
SULLY	Talk & Chalk (with examples to do.	✓					✓		Basic concepts. A lot of practise needed. Better understdng.	Personally feels best way to convey subject.			
	Discussion.	✓			✓					Feedback & hence know how to help. Revision.			
JOULE	Talk & Chalk.	✓					✓		"Teaching is more than communicating information. It is about personalities and people".				
JACKSON	Talk & Chalk.	✓					✓			Explain work & illustrate egs. Followed by setting & checking as they work through. Use to it. Practical.			

(All 3 teachers did not differentiate the "Ideal" from the "Real").

FIG. 5.7

TEACHING RESOURCES/AIDS USED (IDEAL SITUATION) : SCIENCE DEPARTMENT

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE			MACHINE						REASONS				
		Preparation			Know-How Reqd.			Preparation							
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
CAMO	16mm film. filmloops.				 ✓	✓		✓ ✓				Brings into the classroom ideas, concepts&locations othwse unaccessible.	Up-to-date on selected areas of the syllabus.		
JUNE	Bio. models. Specimens. Wider range of books.	✓ ✓	✓												
MIKADO	Video.				✓			✓			As follow-up to practical work.				
	Textbooks.	✓									Learn the art of studying from avail.material. Pupils won't get bored if material is seen relevant & interesting.	Assures full control of class & environment ("pie in the sky")			
	CAL. Library resources All sorts of lab equip.	✓				 ✓	✓			✓ ✓	Open-lab concept.		Equip. easily accessible.		
	OHP. Video.					✓ ✓		✓	✓						

FIG. 5.8

TEACHING RESOURCES/AIDS USED (REAL SITUATION) : SCIENCE DEPARTMENT

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE			MACHINE						REASONS				
		Preparation			Know-How Reqd.			Preparation							
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
CANO	Idea files.					✓		✓					Best ones-expensive/free ones-out of date.		
	Video.				✓			✓					Easily obtainable & recordable.		
	Worksheets.				✓				✓						
	B/g data. (photocopied)				✓				✓						
	Cassettes.				✓			✓							
	Slides.				✓			✓							
	OHP.				✓				✓						
	Wall Charts.				✓			✓							
JUNE	Worksheets.					✓			✓		Tailor made for the group.				
	Specimens.		✓								Followed by questions & answers.		Readily available. Limited amount of time per week to make arrangements.		
	Video.				✓			✓							
	Films.					✓		✓							
	Bio models.	✓													
	Diagrams to be completed.				✓			✓							
MIKADO	Video.				✓			✓					Time. Money.		

FIG. 5.9

TEACHING RESOURCES/AIDS USED (IDEAL SITUATION) : HISTORY DEPARTMENT

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE Preparation			MACHINE Know-How Reqd.			MACHINE Preparation			REASONS				
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
JOHNSON	A.V.A.										Class presentation.				
	CAL (wordpro).						✓		✓						
	Field Studies Centre.			✓											
	Reprographic facilities.												Proper printing & prod. of own AVA material.		
JOACHIM	OHP.				✓				✓		Pictorial				
	Slides.				✓			✓							
	Filestrips.				✓			✓							
	Hist.evidence.				✓				✓						
MALORY	File.				·	✓		✓							
	Video.				✓			✓							
	Filestrips.				✓			✓							
	Pictures.		✓		·										
	CAL						✓			✓					
RIDLEY	More Books.	✓									Pupils can bring it home for homework.				

FIG. 5.10

TEACHING RESOURCES/AIDS USED (REAL SITUATION) : HISTORY DEPARTMENT

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE Preparation			MACHINE Know-How Reqd.			MACHINE Preparation			REASONS				
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
JOACHIM	OHP.				✓				✓			Availof suitable material. Time.			
	Blackboard.	✓													
	Worksheets.				✓				✓						
MALORY	Video.				✓			✓			Enjoyment. Enable learning & growing to take place more effectively.				
	Files.					✓		✓							
	Filestrips.				✓			✓							
	Tapes.				✓			✓							
	Pictures.		✓												
	CAL.						✓			✓		Once a year			
RIDLEY	Books (limited)	✓											Money. Policy of dept.head		
	File.					✓		✓			Variety. Maintains concentration.				
	Video.				✓			✓							
	Slides.				✓			✓							
	Tapes.				✓			✓							
	OHP.				✓				✓						
	Blackboard.	✓													
	Band copies.				✓				✓						
	Photocopies.				✓				✓						
JOHNSON	AVA.												Dept policy ie. framework in which they have decided to operate.		
	CAL.						✓			✓					
	Reprographic facilities.														

FIG. 5.11

TEACHING RESOURCES/AIDS USED (IDEAL SITUATION) : GEOGRAPHY DEPARTMENT

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE			MACHINE						REASONS				
		Preparation			Know-How Reqd.			Preparation							
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
CONSTANCE	Packs or "units" of work (bands).				✓					✓					
	Diff.books.	✓									For diff.abilities.				
	CAL (data analysis).						✓			✓	For 6th form.	Not sure about using it.			
	Simulation games.			✓											
MARK											"I can't imagine a situation of no constraints".				

FIG. 5.12

TEACHING RESOURCES/AIDS USED (REAL SITUATION) : GEOGRAPHY DEPARTMENT

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE Preparation			MACHINE Know-How Reqd.			MACHINE Preparation			REASONS				
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
CONSTANCE	Slides.				✓			✓			Variety.	Preventing oneself fron"switching-off".	Availability. Money. Not enough resources.		
	Films.					✓		✓							
	Books.	✓													
	Handouts.				✓				✓						
	OHP.				✓				✓						
MARK	OHP.				✓				✓		Nature of the grp- Mixed ability classes req open-ended work. O Level pupils need & prefer strongly structured approach. 6th formers apprec discussion but not at expense of clear authoritative lessons.		Availability. Ease of access.	Not enough time to prepare chosen resource bec of timetable workload	Constraints of syll demand high % of info input.
	Blackboard.	✓													
	Films.					✓		✓							
	Video.				✓			✓							
	Slides.				✓			✓							
	Tapes.				✓			✓							
	Maps.		✓												
	Hand-outs.				✓				✓						
	Specimens.		✓												
	CAL.						✓			✓		Computer avail, but not yet used by se.			

FIG. 5.13

TEACHING RESOURCES/AIDS USED (IDEAL SITUATION) : MATHEMATICS DEPARTMENT

(Only 1 out of the 3 teachers mentioned anything)

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE			MACHINE						REASONS				
		Preparation			Know-How Reqd.			Preparation							
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot	For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
JOULE	Video.				✓			✓			Need time to prepare.	Not planned within dept.			
	More Books.	✓									For examples & new approaches.				

FIG. 5.14

TEACHING RESOURCES/AIDS USED (REAL SITUATION) : MATHEMATICS DEPARTMENT

TEACHER	RESOURCES/AIDS MENTIONED	NON-MACHINE			MACHINE						REASONS				
		Preparation			Know-How Reqd.			Preparation			For the sake of the Pupils	For the sake of the Teachers	Due to/Because of the Dept.	Due to/Because of the School	Due to/Because of things outside school
		Min.	Mod.	A Lot	Min.	Mod.	A Lot	Min.	Mod.	A Lot					
SULLY	Blackboard.	✓										Mainly for teaching.	Available. Exposed to these.		
	Textbooks.	✓									For exercises.		Available.		
	Worksheet.				✓				✓		Gives pupils a target. An extra for those who work quickly.				
	Banda material.				✓				✓		Supplements excrs.	Diff.way of teaching.	Available.		
	OHP.				✓				✓			Don't like it bec Not familiar. More equip.& org. needed.	Facility not always available.		
JOULE	OHP.				✓				✓			Like to face class. Able to prepare beforehand. Colour.			
	Banda material.				✓				✓			Quick. Convenient. Colour.			
JACKSON	OHP.				✓				✓			Closer eye on class-control & gauging of underst. Easier to show diag.	Not avai.in some classrooms.	Like OHP & screens readily set up in each classroom & used at moment's notice.	
	Blackboard.	✓										Chalk-dust irritates throat.	Use it bec easily avai despite not satisfactory.		

FIG. 5.15

APPENDIX N : Questionnaire for Head of Mathematics

This questionnaire is in three parts. The first part looks back as to how you intended to introduce the use of computers into your department. The second part is on how you felt progress has been since the computer/s were first purchased. The third part is about the use of the SHARP computers in the department.

PART 1

1.a. When did the department first purchase the BBC computer ?

b. When did it arrive ? _____ c. Model A or B ? _____

d. Who paid for it ? _____

2.a. Did you have to buy any other peripherals ? Yes / No

b. If yes, what were they ? _____

c. When did it arrive ? _____

d. Who paid for them ? _____

3. What storage and access facilities were planned for the computer ?

4. What were the plans for using the computer in the department in relation to teaching, administration, etc. ?

5. What were the plans of the department to encourage members of staff of the department to use it (eg. training, resources) ?

6. What were the reaction of the staff in the department to the acquisition and also the use of the computer ?

7. Any other comments ?

PART 2

1. Could you describe briefly how the initial plans were carried out, mentioning obstacles of particular relevance that were encountered ?

2. Could you describe briefly how the BBC computer is presently used in the department (eg. which years, which subject/topic areas, frequency, etc.) ?

3. What particular problems have been encountered in using the BBC computer ?
a. From the hardware point of view (eg. competence & familiarity with the computer, peripherals, etc.) ?

b. From the software point of view (eg. software packages, CAL materials) ?

c. From the programming point of view ?

d. Were there any unusual or unexpected types of problems that occurred ?

If so, what were they ?

4. Describe any changes of attitudes that have occurred in the members of staff of the department toward computers, the use of computers and computing since the introduction of the BBC computer.

5.a. What are your future plans for the use of the computer in the department ?

b. Is there anything in your future plans that is radically different from your initial plans which will facilitate the use of the computer in the department ?

6. Any other comments ?

PART 3

1.a. When did you purchase the SHARP computers ?

b. How many ? _____ c. Who paid for them ? _____

2. What were the plans for the use of the SHARP computers in the department ?

3. Could you describe briefly how the plans were carried out, mentioning any obstacles of particular relevance encountered ?

4. Could you describe briefly how the SHARP computers are presently used in the department (eg. which years, which subject/topic areas, frequency, etc.) ?

9. Any other comments ?

Thank-you very much.

Peter Chandra.